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Research Article

Childbearing among first- and second-generation Russians in Estonia against the background of the sending and host countries

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Childbearing among first- and second-generation Russians in Estonia against the background of the sending and host countries

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Abstract

BACKGROUND
An expanding literature documents the childbearing patterns of migrants and their descendants in contemporary Europe. The existing evidence pertains mainly to the northern, western, and southern regions of the continent, while less is known about the fertility of migrants who have moved between the countries of Eastern Europe.

OBJECTIVE
The aim of this study is to examine the fertility patterns of first- and second-generation Russians in Estonia, relative to the sending and host populations.

METHODS
The study draws on the Estonian and Russian Generations and Gender Surveys. Proportional hazards models are estimated for the transitions to first, second, and third births.

RESULTS
Russian migrants in Estonia exhibit greater similarity to the sending population, with a lower propensity for having a second and third birth than the host population. This pattern extends to the descendants of migrants. However, mixed Estonian-Russian parentage, enrolment in Estonian-language schools, and residence among the host population are associated with the convergence of Russians' childbearing behaviour

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with the host-country patterns. The findings support the cultural maintenance and adaptation perspectives; selectivity was found to be less important.

CONTRIBUTION
The study focuses on a previously under-researched context and underscores the importance of contextual factors in shaping migrants' fertility patterns. It raises the possibility that, depending on the childbearing trends and levels among the sending and receiving populations, large-scale migration may reduce rather than increase aggregate fertility in the host country. With the advancement of the fertility transition in sending countries, this situation may become more common in Europe in the future.

1. Introduction

During the period following the Second World War, European societies experienced a large influx of migrants (Castles, de Haas, and Miller 2014). For the major receiving countries, the youthful age structure of the migrants made a significant contribution to maintaining a positive balance between births and deaths, and moderated the tempo of population ageing. Owing to their large numbers, immigrants and their descendants have resulted in European societies becoming increasingly heterogeneous in terms of cultural background, and made the advancement of integration an important policy issue (Coleman 2006; 2009).

There is a large and rapidly expanding body of literature investigating different aspects of the lives of immigrants in Europe (Adsera and Chiswick 2007; Solé-Auró and Crimmins 2008; Algan et al. 2010; Rendall et al. 2010; Safi 2010; Bisin et al. 2011; Crul 2013). For several reasons, scholarly interest also extends to the fertility patterns of immigrants and their descendants. Childbearing among the latter is an important issue, since it influences to an increasing degree the aggregate (national) fertility levels, and hence the demographic prospects of the destination countries. It is well known that the proportion of total births to immigrant parents has grown rapidly in many European countries, but it is less clear whether migrants and their children are having a universally positive impact on aggregate fertility levels (Sobotka 2008; Andersson and Persson 2015). Furthermore, the childbearing patterns of migrants provide an additional measure of integration into the host society (Coleman 1994). Studies generally find migrant fertility converging with levels that are characteristic of the native population, although for some groups differences persist (Garssen and Nicolaas 2008; Scott and Stanfors 2011; Dubuc 2012; Krapf and Wolf 2015). Finally, the experience of international migrants who move from one societal context to another offers valuable insight into the roles of various factors that are assumed to shape fertility outcomes. For this reason, research on migrants and their descendants can contribute to an improved understanding of how economic and cultural factors influence fertility decisions.

Our study complements the existing literature by analysing the childbearing behaviour of Russians in Estonia. We examine the extent to which their fertility patterns are similar to those of the sending and host populations. For this purpose, we distinguish between first-generation Estonian Russians and their descendants, who were born and raised in different contexts. In order to understand the process of demographic integration, we seek evidence of factors that facilitate the shift of migrants and their descendants' fertility behaviour towards the host-country patterns. We make a comparative analysis of the transition to first, second, and third births among the migrant and non-migrant groups included in the study, employing longitudinal data and event history methods.

The study extends the research on migrant fertility in several ways. The first contribution of our study stems from the use of a binational sample based on pooled data from the Estonian and Russian Generation and Gender surveys. The availability of comparable life history data for the sending country and the migrants allows us to examine the role of selectivity, which is seldom feasible in studies of international migration (Kahn 1988; Singley and Landale 1998; Lindstrom and Saucedo 2007). Second, with regard to host societies, European research on the fertility patterns of migrants and their descendants relates overwhelmingly to the northern, western, and southern parts of the European Union. Large-scale migration in Eastern Europe occurred mostly within the former state entities that dissolved in the early 1990s (Van Mol and de Valk 2016). Although those who moved between various parts of the former Czechoslovakia, Soviet Union, and Yugoslavia are in hindsight regarded as international migrants, analyses of their childbearing patterns are rare (Jasilioniene, Stankuniene, and Jasilionis 2014). We use this context for testing the applicability of different explanatory models of migrant fertility. Third, the cohort range of the surveys (generations born between the late 1920s and early 1980s) enables coverage of an extended period with contrasting societal regimes (state socialism and transition to a market economy). This contributes to a better understanding of the role of socioeconomic and cultural factors in shaping the childbearing patterns of migrants and their descendants. Finally, we are able to incorporate into the models variables that provide insight into the role of the educational system and spatial concentration of migrants, which are rarely considered in European studies of migrant fertility.

2. Theoretical perspectives and previous findings

Several complementary mechanisms have been proposed to explain childbearing patterns among migrant groups (for a recent overview, see Kulu and González-Ferrer 2014). Following the approach employed in the literature whereby a single study seldom considers all possible mechanisms, this article focuses on the cultural maintenance, adaptation, selection, and composition perspectives, which can be applied to migrants as well as their descendants. Applicability beyond the first generation sets these perspectives apart from several others (disruption, interrelation of events, legitimacy) that focus solely on the short-term impact of the move. Also, the cultural maintenance, adaptation, and selection perspectives primarily relate to differences in the quantum of fertility, which is the main focus of this study.

As childbearing norms and values are transmitted from one generation to the next (Barber 2001; Murphy and Knudsen 2002; Kolk 2014), the fertility patterns inherited from the country of ancestry may persist among migrants and the descendants of migrants. In the literature, the latter phenomenon is termed 'cultural maintenance' (Abbasi-Shavazi and McDonald 2002). The continuity of ethnic childbearing differences across generations is also central to the subculture hypothesis, which was originally developed in order to account for the higher fertility of ethnic minority groups in the US (Goldscheider and Uhlenberg 1969; Roberts and Lee 1974). From another point of view, cultural maintenance is also associated with the socialisation perspective (Andersson 2004; Kulu and Milewski 2007; Milewski 2010). The latter emphasises the role of norms, values, and behavioural patterns to which migrants have been exposed during childhood, and assumes that these influences have a lasting impact over the life course. According to the socialisation perspective, international migrants tend to maintain the childbearing patterns that are characteristic of their country of origin, even if they differ from those prevailing in the host society. As the descendants of migrants are exposed to the norms, values, and behavioural patterns of their parents, socialisation can be viewed as a mechanism that enables cultural maintenance. Socialisation to ethnic subcultures has been considered in European studies as a way to explain fertility patterns among the descendants of migrants that have limited convergence with those prevailing in the host societies (Milewski 2010, 2011; Dubuc 2012).

An alternative perspective is offered by the 'adaptation' mechanism, which explains why the childbearing behaviour of migrants converges with that of the receiving population (Hervitz 1985; Kulu 2005). This perspective emphasises the impact of migrants' current rather than childhood experiences. The literature identifies several mechanisms that are thought to advance the process of adapting to the fertility patterns of the host society (Rumbaut and Weeks 1986; Frank and Heuveline 2005).

First, the general social and economic conditions in the host country are assumed to affect the cost of childbearing (Becker 1981; Hotz, Klerman, and Willis 1997) in a similar manner for all subgroups of the population. Second, through exposure to the host society and social interaction, immigrants are believed to adopt the norms and values prevailing in the destination country (Hirschman 1983; Alba 2005). Shifts in preferences concerning family size and the timing of childbearing are assumed to bring about the convergence of migrants' fertility behaviour with the host-country patterns. The adaptation perspective is also applicable to the descendants of migrants, as convergence with the host-country behaviours may extend across several generations.

The empirical results of studies of childbearing among migrants and their descendants lend support to both the cultural maintenance and adaptation perspectives. Many studies have found that a substantial similarity in fertility levels may be achieved within a relatively short span of time following the arrival of migrants in the host country (Rindfuss 1976; Ford 1990; Mayer and Ripbahn 2000; Andersson 2004). At the same time, the persistence of differences in fertility between migrant groups and the host population, even after controlling for demographic and socioeconomic composition, supports the cultural maintenance argument. In Europe, larger differences are characteristic of migrants from high-fertility settings (Andersson and Scott 2007; Coleman and Dubuc 2010; Milewski 2011). The descendants of migrants from high-fertility contexts tend to have lower fertility levels than their parents' generation, usually between those of the latter and the natives of the host society (Milewski 2007, 2010; Garssen and Nicolaas 2008; Dubuc 2012; Scott and Stanfors 2011; Krapf and Wolf 2015). Similar findings for second-generation migrants are also reported in the United States and Australia (Kahn 1988; Stephen and Bean 1992; Landale and Hauan 1996; Abbasi-Shavazi and McDonald 2000; 2002; Khoo et al. 2002; Parrado and Morgan 2008). Evidence in support of the cultural maintenance and socialisation perspectives also comes from studies that have incorporated country-of-origin fertility levels directly into the multivariate models (Kahn 1988; Cygan-Rehm 2011; Stichnoth and Yeter 2013).

The intermediate position of the second generation reported in many empirical studies indicates that adaptation and cultural maintenance are complementary rather than mutually exclusive.[4] Among the descendants of migrants, childbearing decisions are shaped not only by the host society in which they grew up, but also by their parents' values and norms. It follows that the fertility patterns of the second generation depend on the strength of these competing influences. If the impact of the host society exceeds that of the subgroup, the fertility of the migrants' descendants converges with the host-

[4] Krapf and Wolf (2015) argue that adaptation to host-country fertility norms and preferences may, in fact, be driven by socialisation. Their argument derives from the view that socialisation is a lifelong process that begins in infancy but continues into late adulthood (Settersten Jr. 2002).

country pattern. By contrast, if the influence of the subculture prevails, the second generation exhibits behaviours that are closer to their parents'. This supports the argument that the integration of second-generation migrants may be a segmented process: the descendants of migrants may follow varying paths of adaptation, depending on their parents' human and social capital, and on modes of incorporation into the host society (Zhou 1997; Portes, Fernandez-Kelly, and Haller 2009; Haller, Portes, and Lynch 2011).

Previous research has also provided evidence of specific factors that can facilitate (or hinder) the adaptation of migrants' and their descendants' fertility to native patterns (Forste and Tienda 1996). Fluency in the host-country language appears to play a salient role in reducing fertility among migrants who move from high- to low-fertility settings, and their descendants (Kahn 1988; Swicegood et al. 1988; Kulu and Hannemann 2016). For the second generation, research has revealed the importance of the main language spoken in the parental home (Pailhé 2015). Further, the residential concentration of migrants and ethnic minorities has long been associated with the maintenance of distinctive behavioural patterns. For the United States, Fischer and Marcum (1984) found that residence in predominantly Mexican-American neighbourhoods is associated with higher fertility, net of the effects of individual-level variables. Concerning other aspects of reproductive behaviour, Brewster (1994) demonstrated that differences between racial groups are not solely the outcome of variation in individual characteristics, but also reflect neighbourhood environment. Similar findings are also reported for the United Kingdom (Wilson and Kuha 2016). Finally, in accord with expectations, mixed parentage and partnering with host-country natives have been found to be conducive to the adaptation of migrants' childbearing behaviour (Kahn 1988; Saenz, Hwang, and Aquirre 1994; Andersson and Scott 2007; Scott and Stanfors 2011; Stichnoth and Yeter 2013).

Finally, analyses of fertility patterns among migrants and their descendants must also consider the 'selection' and 'characteristics' perspectives. The selection perspective (Macisco, Bouvier, and Weller 1970; Goldstein and Goldstein 1984) posits that migrants are selected based on various characteristics that may lead to fertility preferences that are distinct from those of the sending population and more similar to those of the host society. Selection can be based on observable characteristics (education, family background, etc.), but migrants may also be selected according to less observable features (norms, values, motives, etc.). Empirical research provides evidence for both types of selection (Lievens 1999; Lindstrom and Saucedo 2002; Mussino and Strozza 2012). The characteristics perspective compares migrants with the natives of the destination country (Jaffe and Cullen 1975; Ng and Nault 1997). According to this perspective, the composition of migrant groups in terms of socioeconomic or cultural characteristics could be partly or wholly responsible for fertility differentials between the former and the latter (Bean, Swicegood, and Berg 2000; Hill and Johnson 2004; Krapf and Wolf 2015). The characteristics of migrants may be transmitted to the second generation by their parents (Frank and Heuveline 2005). Therefore, in order to properly assess the convergence of migrants' and their descendants' fertility with native patterns, their compositional differences from the sending and receiving populations should be considered.

In this study we apply the abovementioned theoretical perspectives to first- and second-generation Russians in Estonia. In order to facilitate the formulation of specific hypotheses, the following section briefly describes the characteristics of the latter group and the fertility patterns of the sending and host populations.

3. The context of the study

3.1 Russians in Estonia

In the newly established Republic of Estonia, ethnic Russians constituted 8% of the total population at the time of the 1922 census. The Second World War inflicted particularly heavy losses on ethnic minorities, including Russians (Katus, Puur, and Sakkeus 1997, 2000a). It has been estimated that following the transfer of border areas from Estonia to Russia in late 1944, the Russian population in Estonia dropped to less than 3% of the total (Katus 1990). Large-scale in-migration from Russia began around 1945 and remained high until the late 1980s; by the late 1980s their proportion had increased to 30% (Sakkeus 1994). Migration to Estonia was to an important extent driven by Soviet economic policies and somewhat higher Estonian living standards, which made the country attractive for labour migrants (Kahk and Tarvel 1997).

The restoration of Estonia's independence brought large-scale immigration to a close and resulted in a wave of return migration in the 1990s (Sakkeus 1996). Since then, the volume of migration between Russia and Estonia has been relatively moderate, and the proportion of ethnic Russians has stabilised at one-fourth of the total population. Post-war migrants to Estonia comprised 38% of Russians residing in the country at the 2011 census; the remaining 62% were their descendants born in Estonia (ESA 2016).

Russians in Estonia are characterised by relatively late integration into the host society, which is to a significant extent the legacy of the period of Soviet rule. Limited skill in the host-country language offers an example, with less than half of Russians (41%) reporting some proficiency in Estonian in 2011 (Puur, Rahnu, and Valge 2016). Integration into the host society is also hindered by a very high concentration of Russians in a few regions of the country. Recent research suggests that in the capital city of Tallinn the spatial segregation between ethnic groups has increased rather than decreased since the late 1980s, driven chiefly by socioeconomic factors (Tammaru et al. 2016; Mägi et al. 2016). Following the transition to a market economy, Russians have encountered greater difficulties in adapting to the new reality: their unemployment rates have been higher and their earnings lower than the national average.[5] There is also evidence of considerable sectoral and occupational segregation of ethnic groups in the labour market (Puur 2000; Luuk 2009; Lindemann 2013). The rates of intermarriage between Russians and the host population are relatively low in Estonia (Van Ham and Tammaru 2011; Rahnu 2016).

However, the situation is gradually changing among the younger generations. Estonian language proficiency among Russians in the young adult age groups exceeded 70% at the time of the 2011 census. It can be expected that similar shifts towards improved integration will occur in other domains as well.

3.2 Fertility trends in Estonia and Russia

Although Estonia and Russia belonged to the same state entity starting from the 18th century, their paths towards demographic modernisation were not identical. In Estonia the onset of the fertility transition can be traced back to the middle of the 19th century, and a rapid decline in birth rates persisted until the late 1920s, when fertility dropped below replacement level (Katus 1994). In Russia, birth rates began a steady fall at the very end of the 19th century, and the fertility transition came to a close in the 1960s (Zakharov 2003, 2008).

The disparity between timeframes of the demographic transition accounted for a noticeable difference in fertility levels between Estonia and Russia in the early postwar decades (Table A-1 in the Appendix). However, during the 1960s fertility levels in the two countries converged.[6] In Estonia, a moderate rise in period fertility rates occurred in the late 1960s which returned fertility to close to replacement level, while in Russia the fertility transition came to a close with the total fertility rate (TFR) stabilising at levels between 1.9 and 2.0 children per woman. As a consequence, the difference in fertility levels between the countries reversed. In the 1970s and 1980s, Estonia

[5] From 2000 to 2015 the difference in unemployment rates between Russians and the total population ranged between 2 and 7 percentage points; in 2014 the net equivalent income of Russians was 13% below the national average for Estonia (ESA 2016).

[6] The convergence extended to other aspects of childbearing as well. Historically, Estonia was characterised by late and low prevalence of marriage, while in Russia marriage occurred at a younger age and was more universal (Coale, Anderson, and Härm 1979). In the 1960s and 1970s Estonia experienced a shift to a lower proportion of never-married and to earlier marriage (Katus, Puur, and Sakkeus 2008). This resulted in a decrease in childlessness and the mean age of motherhood.

exhibited slightly higher TFRs than Russia; the reversal can also be discerned in cohort fertility (Table A-1 in the Appendix). The evidence pertaining to parity-specific measures suggests that the reversal was driven by the progression to second and third births (Bondarskaya 1994; Katus 2000; Zakharov 2008).

A major break in fertility trends occurred in the early 1990s, when birth rates plummeted all over Eastern Europe. In Estonia, the period TFR bottomed out in 1998 at 1.28 children per woman; in Russia, the lowest fertility level (1.16 children) occurred one year later. In the 21st century, fertility rates in both countries have gradually recovered (Puur and Klesment 2012; Frejka and Zakharov 2012; Zakharov 2015). In Estonia, a persistent recovery began in 2004, and the highest period TFRs were achieved from 2008 to 2010 (1.70–1.72 children per woman).[7] In Russia, the recovery was spread over a somewhat longer span of years, but the peak level from 2012 to 2013 (1.69–1.71 children) was similar to that observed in Estonia a few years earlier. Recent comparative studies (Myrskylä, Goldstein, and Cheng 2013; Frejka et al. 2016) suggest that Estonia's moderate advantage in completed cohort fertility has persisted in generations born in the late 1960s and early 1970s, whose family formation largely began in the 1990s.

4. Research aim and hypotheses

Although previous research has addressed fertility patterns among the migrant-origin population in Estonia (Katus, Puur, and Sakkeus 2000b, 2002; Katus, Puur, and Põldma 2002; Billingsley, Puur, and Sakkeus 2014), only a few analyses have specifically focused on the fertility behaviour of Estonian Russians (Sakkeus 2000; Abuladze et al. 2013). This study aims to fill this void by systematically comparing them with the populations of the sending and host countries.

Our first hypothesis (H1) posits that the fertility patterns of Russians in Estonia bear greater resemblance to those of the country of origin than to those prevailing in the host society. The hypothesis draws on the cultural maintenance perspective, according to which migrant groups may preserve fertility behaviour that is different from the country of destination for several generations. Our assertion is guided by the contextual features described in the previous section, including slow integration during the Soviet period, the large size of the group, spatial concentration, and linguistically divided schools.

Our second hypothesis (H2) anticipates that the childbearing behaviour of second-generation Russians in Estonia will more closely resemble that of the first generation

[7] From 2011 to 2015 the period TFRs have fluctuated between 1.52 and 1.61 children per woman in Estonia (ESA 2016).

than that of the host population, in accord with the cultural maintenance perspective. Slow integration makes this outcome plausible. But even if this hypothesis is confirmed, we expect that greater integration into the host society, measured by individual and contextual variables, will be associated with convergence with the host-country patterns (hypothesis H3).

Our fourth hypothesis (H4) is that differences between the groups included in this study will vary across parity transitions. Based on the convergence that occurred in the timing of parenthood and levels of childlessness between the sending and receiving countries, we anticipate little or no difference in the transition to first birth. However, we expect more inter-group variation in second- and third-birth risks, in line with the fertility trends in the sending and host countries discussed in the previous section.

In addition to testing our main hypotheses, this study is expected to provide some insight into the role of selection and the characteristics of the migrants. Research on migrant fertility reviewed in earlier sections shows that the profile of migrants and their descendants, in terms of socioeconomic status and other characteristics, may be different from that of the sending or receiving populations. It can be assumed that the specificity of fertility behaviour among migrants and their descendants will be diminished when these differences are controlled for.

5. Data and methods

This study used data from the national surveys carried out in Estonia and Russia 2004–2005 within the framework of the Generations and Gender Programme (Vikat et al. 2007).[8] Both surveys applied the life course approach and collected detailed retrospective histories of childbearing and partnership dynamics, and a variety of other issues. Comparability of the data was achieved through common guidelines for the survey design, and a standard questionnaire and survey instruments (UNECE 2005). Both surveys used nationally representative probability samples of the resident population. In the Estonian survey, respondents were selected from the population enumerated in the 2000 census, employing a single-stage random procedure; a total of 7,855 women and men born between 1924 and 1983 were interviewed, with a response rate of 70%. The Russian survey used a multi-stage sampling procedure resulting in 11,261 interviews with respondents in the 1924–1987 birth cohorts; the overall response rate for the Russian GGS was 44%. Further information on the data sources is available from methodological publications (Independent Institute for Social Policy 2004; Katus, Puur, and Põldma 2008).

[8] We use the first wave of the Russian GGS and the sole wave of the Estonian GGS.

We investigate childbearing patterns among Russians who have settled in Estonia, against the background of Estonians in the host country and Russians in the country of origin. These three groups were defined on the basis of self-declared ethnicity, which was available from both surveys. Russians in Estonia were divided into migrants (the first generation), who were born abroad, and the descendants of migrants, who were born in the host country but whose parents (or grandparents) had migrated to Estonia.[9] Guided by an approach frequently taken in fertility research, only women were included in the analyses.

The childbearing transitions examined in the following sections include entry into motherhood, progression from first to second birth, and progression from second to third birth. In order to compare fertility patterns among the subgroups included in the study, we fitted piecewise constant proportional hazards models for each parity transition. To measure the effect of the covariates, the models use time (in months) to conception, backdated from recorded live births. The onset and end of the risk periods vary between models for each parity transition, and are explained in the section that follows. Table 1 presents the number of women, births, and exposure time used in the models, disaggregated by parity transitions and population groups. Additional information on our study population (exposure time and number of births disaggregated by parity transitions and control variables) is provided in the Appendix (Table A-2).

Our modelling strategy was as follows. For each parity transition, we estimated a series of main effects models and monitored the change in the effect of the main independent variable (population group) on fertility outcomes as other covariates were added in a stepwise procedure.[10] The first model (M1) included the main independent variables, process time, and birth cohort (prior to 1930, 1930–1939, 1940–1949, 1950–1959, 1960–1969, 1970–1979, 1980–1987). In the second model (M2), a time-varying control for partnership status (married, cohabiting, no partner) was added; in the models for second and third births, M2 also included the age of the respondent at first birth (15–19, 20–24, 25–29, 30+). Model M3 adds controls for the respondents' birthplace (major city, urban, rural) and number of siblings (0, 1–2, 3+). In Model M4 we added a time-varying covariate for educational attainment (currently enrolled in education, ISCED1–2; ISCED3–4; ISCED5–6). Model M5 (the final model) includes an additional control for lifetime migration history. This variable combines information on the

[9] In our study, the descendants of migrants consist mostly of second-generation migrants (81%), plus a small group of third-generation migrants (19%). Second-generation migrants are defined as those who were born in the country of current residence and who have at least one parent born in a foreign country. Third-generation migrants are those who themselves and whose parents were born in the country of current residence. It would have been preferable to present the results separately for second- and third-generation migrants, but the limited sample size of our survey data prevented us from doing this.

[10] The choice of control variables was guided by literature reviews and recent parity-specific studies (Balbo, Billari, and Mills 2013; Klesment et al. 2014; Wood, Neels, and Kil 2014). In the preliminary analysis we experimented with several alternative specifications to check the robustness of the findings.

respondents' birthplace and residence at the time of the survey, and classifies it according to four categories (urban, from urban to rural, from rural to urban, rural).[11]

Table 1: Number of respondents, childbearing events, and exposure time. Russians in Estonia, sending and host populations, female birth cohorts 1924–1987

Parity and population group	Number of respondents	Number of births	Exposure time (person-months)[1]
First birth			
Russians in Russia	5,777	4,858	623,909
1st generation Russians in Estonia	777	711	93,371
2nd+ generation Russians in Estonia	612	462	64,035
Estonians	3,296	2,733	393,059
Second birth			
Russians in Russia	4,793	2,714	504,775
1st generation Russians in Estonia (ref)	706	472	77,033
2nd+ generation Russians in Estonia	461	244	44,896
Estonians	2,709	1,923	210,352
Third birth			
Russians in Russia	2,696	570	453,485
1st generation Russians in Estonia (ref)	470	75	92,424
2nd+ generation Russians in Estonia	245	38	37,834
Estonians	1,912	695	263,633

[1]Time at risk starts at age 15 for first birth or at date of previous birth for higher-order parities and ends 8 months prior to recorded live birth; censoring occurs at interview or at age 45 for first birth or 20 years after previous birth for higher-order parities.
Source: Estonian and Russian GGS, authors' calculations.

For second and third births we estimated a few additional models (M6, M7, and M8) in order to investigate whether Russians' greater integration into Estonian society is associated with convergence in childbearing patterns. These models are based on M5 and incorporate mixed Russian-Estonian parentage, exposure to the host-country language at school, and the proportion of Estonians in the municipality of residence.[12] The focus on second and third births in these additional models is motivated by the fact

[11] Birthplace was removed from Model M5, since it partially overlaps with the migration history variable.
[12] At the stage of exploratory analysis we also examined the influence of mixed Russian-Estonian partnerships. However, as the effect proved relatively weak and statistically insignificant for all parities, the partner's ethnicity is not considered in the article.

that the difference in fertility levels between Russians in Estonia and Estonians mainly relates to the progression beyond first birth, as will be demonstrated in the following section. Therefore, the effects of the integration variables are sought from the transition to second and third births.

The modelling results, produced as maximum likelihood estimates of parameter effects, are presented in the form of hazard ratios. To conserve space, presentation of the findings focuses on the main independent variable. Discussion of the results for the control variables is omitted in the article, but estimates based on the final model are available in the Appendix (Table A-3).

6. Results

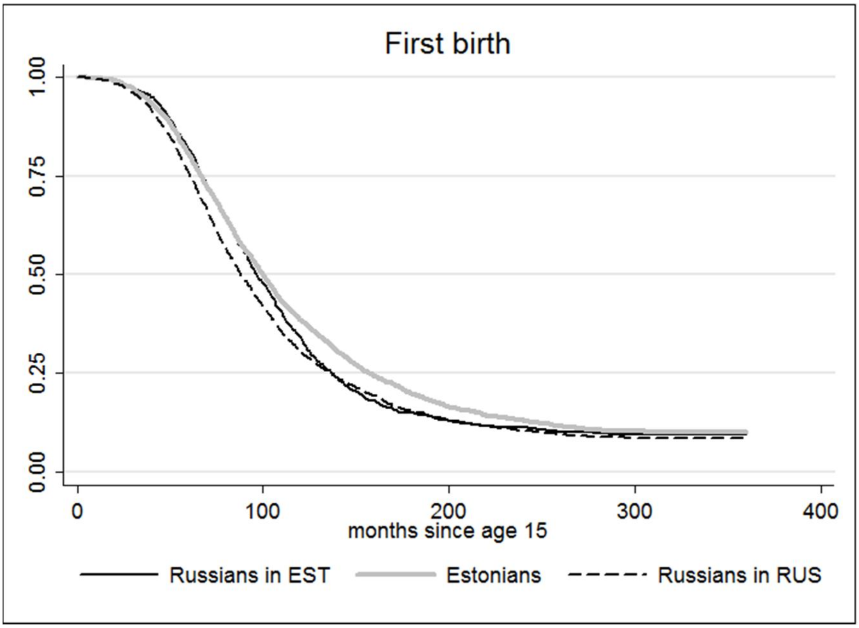
6.1 Transition to motherhood

As the first step, we present Kaplan-Meier estimates of the proportion of childless women by age among Russians in Estonia, Russians in the country of origin, and Estonians (Figure 1).

A comparison of survival curves shows virtually no difference in the proportion of women who eventually enter motherhood: in all three groups around 90% of women have at least one child. This finding reflects the disappearance of the Malthusian marriage pattern in Estonia during the early postwar decades, as noted in previous sections. With regard to timing, Russian women in their country of origin tend to have their first child earlier than Estonians, whereas Russian women in Estonia display an intermediate pattern between the former and the latter. At younger ages the fertility behaviour of childless Russian women in Estonia bears a stronger resemblance to the host population, but after passing the median age at first birth their entry into motherhood tends to accelerate. As a consequence, the proportion of childless Russian women in Estonia converges with that of their coethnic counterparts in their country of origin. Disaggregation of the former group of women into first-, 1.5-, and second-generation migrants (not shown) suggests that the similarity in estimates between Estonian Russians and Estonians observed at younger ages may be driven by the disruption effect related to migration from one country to another.[13]

[13] The ‘1.5 generation’ refers to migrants who arrived in the host country as children. In our study, 13% of Russian women residing in Estonia belonged to the 1.5 generation.

Figure 1: Kaplan-Meier estimates for transition to first birth. Russians in Estonia, sending and host populations, female birth cohorts 1924–1987



Source: Estonian and Russian GGS, authors' calculations

Table 2 displays the estimates of first-birth risks from a series of event history models for childless women. The respondents were followed from age 15 until the conception that led to motherhood, censoring at the respondents' 45th birthday or the interview, whichever event occurred first. A small number of respondents who had conceived their first child before age 15 were excluded from the analysis.

In the upper panel of the table we compare first-birth risks of Russian women in Estonia to those of the sending and receiving populations. Although the results reveal only a small difference in hazard ratios, systematic variation between the groups can still be discerned. In accord with the Kaplan-Meier results, the model estimates for Russians in Estonia tend to exhibit an intermediate level of first-birth risks that falls between that of the sending and host populations. The highest first-birth risks are characteristic of the former, while the lowest are typical of the latter. The scale of differences varies as controls are added, but in the final model Russian women in Estonia exhibit a statistically significant difference from their coethnic counterparts in

Russia as well as from Estonians (the difference from Estonians is significant only at the 10% level). The Kaplan-Meier estimates suggest that the observed differences in first-birth risks are driven wholly by the timing of childbearing (the ultimate proportion of women who enter motherhood does not vary across the population groups included in the study).

Table 2: Hazard ratios for transition to first birth (piecewise constant proportional hazards models). Russians in Estonia, sending and host populations, female birth cohorts 1924–1987

Population group	M1	M2	M3	M4	M5
Russians in Russia	1.07**	1.09***	1.08**	1.14***	1.09**
Russians in Estonia (ref)	1	1	1	1	1
Estonians	0.92**	1.01	0.98	1.01	0.94*
Russians in Russia	1.04	1.07*	1.10**	1.15***	1.07
1st generation Russians in Estonia (ref)	1	1	1	1	1
2nd+ generation Russians in Estonia	0.93	0.96	1.05	1.03	0.96
Estonians	0.89***	1.00	1.00	1.02	0.92*

Note: ***p<0.01; **p<0.05; * p<0.1.
Time at risk starts at age 15; censoring occurs at interview date or age 45.
Model 1: controlled for process time and birth cohort.
Model 2: M1 additionally controlled for partnership status.
Model 3: M2 additionally controlled for birthplace and number of siblings.
Model 4: M3 additionally controlled for education.
Model 5: M4 additionally controlled for migration history. Estimates for control variables are presented in the Appendix (Table A-3).
Source: Estonian and Russian GGS, authors' calculations.

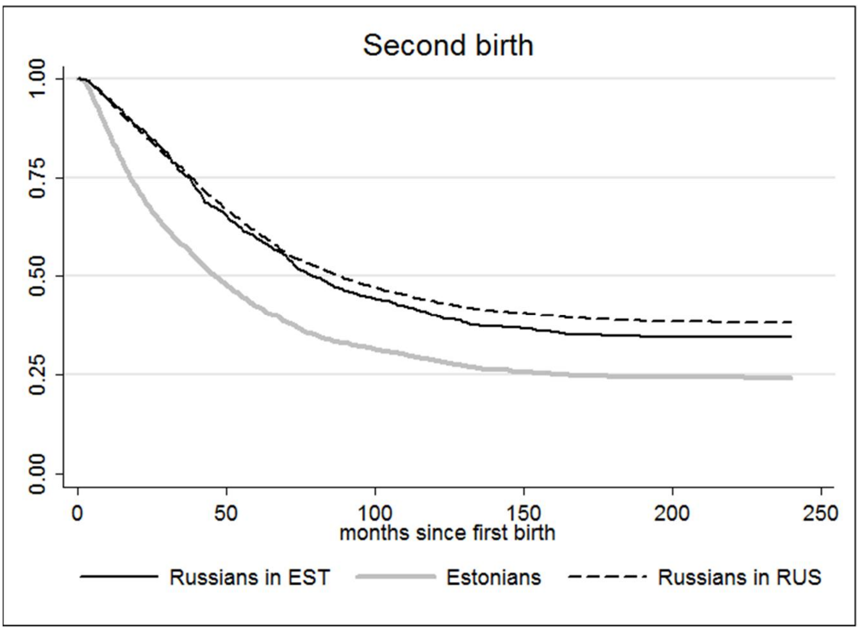
The lower panel of Table 2 presents a comparison of first-generation Russians and their descendants in the host country. In general, the model estimates show only a limited difference between the latter and the former: the difference in hazard ratios ranges from –7% to 5%, reaching statistical significance in none of the models. However, the modelling results reveal a moderate shift across generations towards increased convergence with the host population. In the final model the first-birth hazard for the descendants of Russian migrants lies between that of first-generation Russians and that of Estonians. As a consequence, the difference in hazard ratios between the descendants of Russian migrants and Estonians fails to reach the level of statistical significance, unlike that for the first generation.[14] This shift towards convergence also explains why the difference between the sending population and the first generation of Russians is smaller than that between the sending population and all Russians in Estonia, and why it is statistically insignificant.

[14] To test the statistical difference between second-generation Russians and Estonians, we ran additional models with the latter as the reference category.

6.2 Transition to second birth

The analysis of second birth follows the same scheme as that employed for first birth. Figure 2 displays the Kaplan-Meier plots for the transition to second birth, which includes all women who have entered motherhood. The comparison of survival curves reveals that for second births the difference between the population groups is not limited to the timing of childbearing but extends to parity progression ratios. Approximately three-quarters of Estonian mothers give birth a second time, while the corresponding proportion of Russians in their country of origin is slightly above 60%. The Kaplan-Meier estimates for Russians residing in Estonia are between those of the host and sending populations, but are closer to the latter.

Figure 2: Kaplan-Meier estimates for transition to second birth. Russians in Estonia, sending and host populations, female birth cohorts 1924–1987



Source: Estonian and Russian GGS, authors' calculations

Table 3 presents estimates from proportional hazards models for second-birth risks. The respondents were followed from their first birth until the conception that resulted in a second birth; censoring occurred at the interview or 20 years after the first birth. Respondents who had given birth to twins were excluded from the analysis of second (and third) births.

The estimates corroborate the pattern revealed by descriptive measures. It appears that Russian women in Estonia feature an intermediate level of second-birth risks that is markedly lower than that of the host population but exceeds that of Russians in their country of origin. Although the hazard ratios vary across models, in the final model Russians in Estonia exhibit second-birth risks that are significantly different from those estimated for Estonians as well as from those of their coethnic counterparts in Russia. However, the second-birth risks for Russians in Estonia are more similar to those of their counterparts in their country of origin.

Table 3: Hazard ratios for transition to second birth (piecewise constant proportional hazards models). Russians in Estonia, sending and host populations, female birth cohorts 1924–1987

Population group	M1	M2	M3	M4	M5
Russians in Russia	0.93*	0.99	0.99	1.01	0.91**
Russians in Estonia (ref)	1	1	1	1	1
Estonians	1.53***	1.72***	1.66***	1.68***	1.45***
Russians in Russia	0.89**	0.96	1.00	1.02	0.90*
1st generation Russians in Estonia (ref)	1	1	1	1	1
2nd+ generation Russians in Estonia	0.84**	0.88	1.01	1.01	0.95
Estonians	1.46***	1.67***	1.69***	1.70***	1.44***

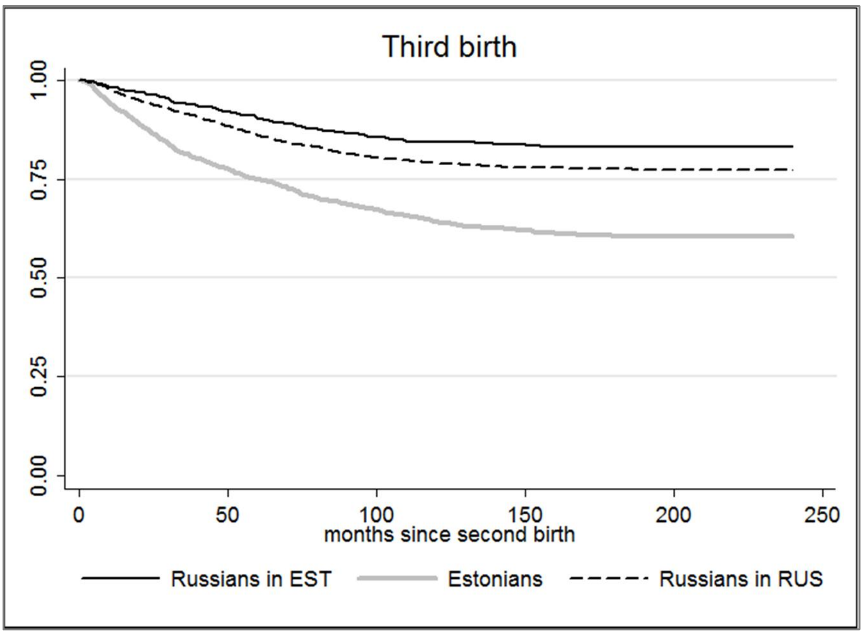
Note: ***p<0.01; **p<0.05; * p<0.1.
Time at risk starts at first birth; censoring occurs at interview date or 20 years after first birth.
Model 1: controlled for process time and birth cohort.
Model 2: M1 additionally controlled for age at first birth and partnership status.
Model 3: M2 additionally controlled for birthplace and number of siblings.
Model 4: M3 additionally controlled for education.
Model 5: M4 additionally controlled for migration history. Estimates for control variables are presented in the Appendix (Table A-3).
Source: Estonian and Russian GGS, authors' calculations.

The evidence pertaining to migrant generations reveals no further convergence of second-birth risks for the descendants of Russian migrants with the Estonian host population. The hazard ratios indicate that the pattern of second childbearing is very similar for first- and second-generation Russians.

6.3 Transition to third birth

In contemporary low-fertility settings, progression beyond the second child is considered discretionary (Ryder 1980; Sobotka and Beaujouan 2014). Although only a minority of women in our study opted to have a third child, Kaplan-Meier estimates reveal a considerable difference between the groups (Figure 3). Among the host population, around 40% of mothers have a third child, whereas the corresponding proportion in the country of origin does not exceed 25%. Unlike for lower parities, Russians in Estonia feature the lowest rate of progression to third births among the three groups (20%).

Figure 3: Kaplan-Meier estimates for transition to third birth. Russians in Estonia, sending and host populations, female birth cohorts 1924–1987



Source: Estonian and Russian GGS, authors' calculations

Table 4 presents the model estimates of third-birth risks for mothers of two children. We followed the respondents from their second birth until they conceived the next child; observations were censored at the interview or 20 years after the second birth, whichever event occurred first.

Multivariate results corroborate the pattern revealed by the Kaplan-Meier plots. Russians in Estonia feature a likelihood of third births that is lower than their counterparts in Russia, and even lower than in the host population. A comparison of estimates obtained from the initial and final models shows that the inclusion of control variables markedly reduces the difference in third-birth risks across the subgroups investigated in the study. This suggests that there may be selectivity associated with Russians in Estonia that is accounted for by our control variables. Likewise, a decrease in the hazard ratio for the host population can be seen as evidence of some compositional differences between that population and Russians in Estonia.

Table 4: Hazard ratios for transition to third birth (piecewise constant proportional hazards models). Russians in Estonia, sending and host populations, female birth cohorts 1924–1987

Population group	M1	M2	M3	M4	M5
Russians in Russia	1.40***	1.35***	1.31***	1.41***	1.19*
Russians in Estonia (ref)	1	1	1	1	1
Estonians	2.80***	2.72***	2.72***	2.72***	2.09***
Russians in Russia	1.46***	1.41***	1.43***	1.50***	1.21
1^{st} generation Russians in Estonia (ref)	1	1	1	1	1
2^{nd+} generation Russians in Estonia	1.13	1.15	1.30	1.23	1.05
Estonians	2.91***	2.84***	2.95***	2.90***	2.13***

Note: ***p<0.01; **p<0.05; * p<0.1.
Time at risk starts at second birth; censoring occurs at interview date or 20 years after second birth.
Model 1: controlled for process time and birth cohort.
Model 2: M1 additionally controlled for age at first birth and partnership status.
Model 3: M2 additionally controlled for birthplace and number of siblings.
Model 4: M3 additionally controlled for education.
Model 5: M4 additionally controlled for migration history. Estimates for control variables are presented in the Appendix (Table A-3).
Source: Estonian and Russian GGS, authors' calculations.

A closer examination of Table 4 reveals that the bulk of the reduction in hazard ratios occurs after introducing the control for migration history. This observation comes as no surprise since the variable captures the most conspicuous feature of Russians in Estonia – very high concentration in urban areas – that distinguishes them from both the sending and host populations.[15] Although urban–rural differences have declined over time, the urban context continues to be associated with lower fertility in contemporary Europe, with regard to higher parities in particular (Hank 2002; Kulu, Boyle, and

[15] According to the 2011 census, 92% of Russians and 58% of Estonians in Estonia lived in urban settlements (ESA 2016).

Andersson 2009; Kulu 2013). This universal pattern of contextual fertility differentials is also reported for Estonia and Russia (Zakharov and Ivanova 1996; Katus, Puur, and Põldma 2002; Kulu 2005).

The distinction between migrant generations corroborates the finding reported above for second births. The model estimates do not reveal a statistically significant difference in third-birth risks between first-generation Russians who settled in Estonia during the postwar decades and their descendants who have been born in the host country.

6.4 Factors associated with convergence with host-country patterns

For second and third births, which exhibit a larger difference in parity progression between Russians in Estonia and the host population, we estimated some additional models in order to see whether a greater degree of integration is associated with convergence in childbearing patterns. Our additional models were based on the final models (M5) for second and third parity, to which we added three variables: mixed Russian-Estonian parentage, host-country language of instruction, and percentage of Estonians in the municipality of residence. The latter variable was time-varying, derived from the migration history of the respondents. In view of the correlation between our three integration variables, we opted to include them in the models one at a time. The models were estimated only for Russians in Estonia, as integration variables are not relevant to the sending and host populations.

As shown in Table 5, all three variables are associated with statistically significant increases in the likelihood of a subsequent birth, i.e., a shift towards the higher second- and third-order fertility rates characteristic of the host population. Among Russians in Estonia, coming from a mixed Estonian-Russian family entails an increase of approximately 50% in the hazard ratio for second and third births. However, due to a smaller number of observations, for third births the difference from the reference category fails to reach the level of statistical significance. Enrolment in an Estonian-language school is associated with a largely similar difference in second-birth risks. For third births the effect of language of instruction appears to be even stronger, suggesting more or less complete convergence with the host population for Russians who attended Estonian-language schools.

Table 5: Hazard ratios for transition to second and third birth (piecewise constant proportional hazards models). Russians in Estonia, female birth cohorts 1924–1983

Variables	Second birth			Third birth		
	M6	M7	M8	M6	M7	M8
Mixed Estonian-Russian parentage						
Yes	1.51**			1.54		
No (ref)	1			1		
Estonian-language school						
Yes		1.45*			3.23***	
No (ref)		1			1	
Proportion of Estonians in municipality of residence						
0–29% (ref)			1			1
30–69%			0.92			0.71
70+%			0.98			2.16***

Note: ***p<0.01; **p<0.05; * p<0.1.
Time at risk as explained in Tables 3 and 4.
Model 6: M5 (explained in Tables 3 and 4), additionally controlled for mixed parentage.
Model 7: M5 (explained in Tables 3 and 4), additionally controlled for school language.
Model 8: M5 (explained in Tables 3 and 4), additionally controlled for population composition at municipality of residence.
Source: Estonian and Russian GGS, authors' calculations

Strengthening of the effect towards higher parity can also be observed for our third integration variable. While the composition of the local population makes virtually no difference in the hazard of second birth, third-birth risks are doubled for Russian women residing in municipalities where Estonians comprise more than 70% of the population.

7. Summary and discussion of the findings

This study investigated fertility among Russian migrants and their descendants in Estonia, against the background of the sending and host populations. Large-scale migration from Russia to Estonia started in the aftermath of the Second World War and persisted at a high level for more than four decades. Considering the period during which it occurred and the timeframe of demographic modernisation in the sending and receiving countries, migration from Russia to Estonia bears a certain resemblance to post-war labour migration from the countries of Southern Europe to the northern and western parts of the continent. Although earlier studies have produced valuable accounts of overall fertility patterns among ethnic Russians living outside Russia (Bondarskaya 1977; 1994; Bondarskaya and Darsky 1988; Darsky and Andreev 1991;

Andreev and Darsky 1992), no study to date has compared childbearing patterns of migrants from Russia and their descendants born in the receiving countries. To the best of our knowledge, this is the first study that focuses specifically on fertility among Russians and their descendants who have settled in a member state of the European Union. Aside from focusing on an important but previously underexplored context and group of migrants, the contribution of this study to the literature arises from its use of life history data that extend to the country of origin, and its parity-specific approach, which provides us with a detailed account of childbearing behaviour. Finally, unlike much contemporary research on migrant fertility in Europe, this study deals with migrants moving between two low-fertility settings, with a somewhat higher fertility level at their destination.

The results supported our first hypothesis (H1) about the fertility patterns of Russians in Estonia. In line with the cultural maintenance (subculture) perspectives, the childbearing pattern of Russian migrants and their descendants bears considerable resemblance to that of their country of origin. This pattern combines a somewhat earlier entry into motherhood with lower progression rates to second and higher-order births, relative to the host population. A similar fertility pattern has also been reported for Russian women in Kyrgyzstan (Nedoluzhko and Andersson 2007), and for post-1989 migrants from the former Soviet Union to Israel (Okun and Kagya 2012). At the same time, we found moderate signs of departure from the patterns characteristic of the country of origin, and a shift towards the host-country patterns, which lends support to the adaptation perspective. This is exemplified by entry into motherhood and the transition to second births. For both transitions the model estimates reveal that Estonian Russians occupy an intermediate position, with hazard ratios falling between those of the sending and host populations. The variation in first-birth risks relates wholly to the timing of parenthood; for second births, adaptation has a bearing on the quantum of fertility as well.

Our second hypothesis (H2) anticipated that first-generation Russians in Estonia and their descendants would exhibit largely similar childbearing patterns. The findings confirmed this assertion. None of the models estimated for first, second, and third births reveal a statistically significant difference between migrants and their descendants born in the host country. After controlling for the respondents' family background, demographic and socioeconomic characteristics, and migration history, the difference in hazard ratios between first- and second-generation Russians was limited to a few percentage points. This lends additional support to the cultural maintenance arguments, which suggest that the descendants of Russian migrants to Estonia were raised primarily under the influence of a subculture that has enabled many second- and higher-generation Russians to preserve behaviours that extend back to their parents' country of origin.

We are inclined to attribute the dominance of subculture over adaptation at least in part to historical legacy and contextual features, such as the high spatial concentration of Russians into limited and overwhelmingly urban areas, and the persistent linguistic division in the educational system. The results obtained from models that include various integration variables confirm our third hypothesis (H3) that fuller integration into the host society is associated with the convergence of childbearing with the host-country patterns. More specifically, being born into a mixed Russian-Estonian family, being enrolled in an Estonian-language school, and living in areas where Estonians constitute a large majority of the population are associated with significant increases in the likelihood of second or third births, i.e., towards the levels characteristic of the host population. These findings can be seen as providing further support for the adaptation perspective, although adaptation processes have been proceeding slowly due to the issues discussed above. Incomplete acquisition of the host-country language seems to be the particular feature that distinguishes the descendants of Russian migrants to Estonia from 'typical' second-generation migrants in host societies in contemporary Europe.[16]

In accord with our final hypothesis (H4), the comparison of model estimates for different parities confirms that differences in childbearing behaviour between Russians in Estonia and the host population are concentrated in second- and third-order births. This finding arises from the tendency of Russians in Estonia to follow the fertility behaviour of their country of origin, which is different from the childbearing patterns of the host society (Katus 2000; Zakharov 2008; Puur and Klesment 2012). Judging from the results, selection and compositional differences have played a moderate role in shaping the fertility patterns of Russians in Estonia. Most importantly, a very high concentration in urban areas seems to have made a discernible contribution to reducing their higher-order fertility rates, relative to both the sending and host populations. However, one might view the influence of the integration variables reported in this study from a selection perspective. For instance, certain members of the minority group may be more amenable to integration, which could be manifested in a range of behaviours, from language acquisition to childbearing patterns that converge with those of the host population. However, investigation of the role of selection in integration processes is beyond the focus of this article.

The view that adherence to an ethnic subculture is the main factor accounting for lower second- and third-birth rates among Russians in Estonia, relative to the host population, may be contested on the grounds that the GGS data provided only limited

[16] Among cohorts born in the late 1960s and 1970s there is practically no difference in self-reported proficiency in the host-country language between first- and second-generation migrants in Estonia (Puur, Rahnu, and Valge 2016). Likewise, the 2011 census revealed no substantial difference in the aquisition of the host-country language between second- and third-generation migrants who were born during the latter decades of the 20th century.

information on the socioeconomic circumstances of the respondents. We were only able to consider educational attainment, not the labour market and income histories of the respondents. Given the less advantageous economic position of Russians in Estonia, it is possible that economic uncertainty may have reduced their fertility rates relative to the host population. Support for this argument can be derived from a study of post-1989 immigrants from the former Soviet Union to Israel (Okun and Kagya 2012). The authors of this study identified economic uncertainty and hardship as the central factors accounting for lower transition rates to second and third births, relative to comparison groups in Israel.[17] However, although some influence of economic factors is plausible, we doubt that this explanation would apply to Russians in Estonia. It is significant that the emergence of lower fertility among the latter, relative to Estonians, preceded the transition to a market economy by several decades (Bondarskaya 1977; 1994), which makes attributing the fertility differentials to economic uncertainty questionable.[18] Arguments against overstating the role of economic factors are also supported by the similarity of the fertility patterns of Russians in Estonia to those of their country of origin, as shown in this study. In our search for factors that would explain the low transition rates to second and third births among Russians in Estonia, we subscribe to Scott and Stanfors (2011) who, in their study of the Swedish context, attributed the low second-birth risks among second-generation East Europeans to their lower fertility norms relative to the host population.

The main conclusions that can be drawn from this study are as follows. First, the cultural maintenance and adaptation perspectives developed in other settings can be successfully applied to childbearing patterns among migrant groups which completed a transition to low fertility a number of decades ago, and who have moved to a country with somewhat higher fertility relative to their country of origin. Second, our results cast some doubt on the notion that migrants can in time alleviate the consequences of low fertility in the receiving countries of Europe. The findings pertaining to Russians in Estonia suggest that in some circumstances migrants and their descendants may even contribute to reducing aggregate fertility levels in the host country. Judging from the literature, lower fertility among migrants moving from one European country to another is not exceptional, but has been reported in several settings in Western Europe (Toulemon 2004; Milewski 2010; González-Ferrer, Castro-Martin, and Kraus 2015; Kulu and Hannemann 2016). But so far the higher fertility of new arrivals from the

[17] It is worth noting that Okun and Kagya (2012) have not incorporated measures of labour market uncertainty or income in their analysis. This implies that their explanation is not empirically grounded.

[18] Census evidence indicates that the difference in completed fertility between native Estonians and the migrant-origin population started to emerge in the generations born during the 1930s: the difference increased up until the birth cohorts of the 1950s and stabilised thereafter (Klesment, Puur, and Valge 2010). Among the cohorts born after the mid-1960s, completed fertility has moderately decreased for all groups, but the pattern and magnitude of the intergroup difference has persisted.

Middle East, Asia, and Africa has more than compensated for the lower fertility of intra-European migrants. However, the situation may change in the future, as the fertility transition advances in regions beyond Europe.[19] Third, our results underscore the importance of comprehensive integration policies for Estonia. More specifically, the findings call into question the maintenance of a linguistically divided school system. In its present mode, the divided school system serves as a mechanism that reinforces pillarisation of the society. The literature has already drawn attention to the benefits of less selective school systems for educational and labour market outcomes (Crul 2013; Lindemann 2013): this study seems to extend the positive outcomes of more inclusive and less differentiated educational systems to the fertility domain.

Finally, this study is not without limitations. The main focus of the study was the quantum of fertility, which has left several potentially interesting aspects of childbearing behaviour unaddressed. A major contrast in fertility patterns between contemporary Estonia and Russia relates to the spread of nonmarital childbearing, plausibly reflecting the difference in time periods during which modern cohabitation became widely accepted in the two countries (Puur et al. 2012). Also, there is evidence pertaining to the variation between Estonia and Russia in the educational gradient of childbearing (Rieck 2006; Klesment and Puur 2010) that raises the question of which gradient prevails among migrants from Russia to Estonia. A further limitation of this study relates to the fact that the data used in the study does not extend beyond 2004–2005. This means that the progress the descendants of Russians may have made in integrating into the host society may not be fully discernible in our results. For the same reason, it is not possible to investigate to what extent the latter group participated in the recovery of fertility rates that accelerated in Estonia after 2004. These are topics that should be addressed in future research.

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[19] This argument is supported by evidence from Sweden, where the descendants of immigrants feature lower fertility than women of native Swedish background. According to Andersson and Persson (2015), the difference has been widening since the turn of the 21st century. This may also be the case for other countries in which the proportion of intra-European migrants is high. On average, the proportion of the latter in the EU countries slightly exceeds 50% (Eurostat 2016).

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Appendix

Table A-1: Total period fertility rate and completed cohort fertility, Estonia and Russia

Periods and birth cohorts	Estonia	Russia
Period		
1955–1959	2.00	2.72
1960–1964	1.95	2.41
1965–1969	1.97	2.06
1970–1974	2.13	2.01
1975–1979	2.04	1.96
1980–1984	2.10	1.99
1985–1989	2.21	2.11
1990–1994	1.69	1.59
1995–1999	1.33	1.25
2000–2004	1.37	1.28
2005–2009	1.64	1.41
2010–2013	1.60	1.64
Birth cohort		
1925–1929	1.78	2.21
1930–1934	1.78	2.17
1935–1939	1.79	2.04
1940–1945	1.83	1.93
1945–1949	1.92	1.84
1950–1954	1.97	1.89
1955–1959	2.02	1.88
1960–1964	1.96	1.76
1965–1969	1.85	1.64

Sources: ESA 2016, Zakharov 2008, 2015.

Table A-2: Number of childbearing events and exposure time for control variables. Russians in Estonia, sending and host populations, female birth cohorts 1924–1987

Variables	1st generation Russians in Estonia						2nd+ generation Russians in Estonia					
	Exposure to 1st birth risks (person-months)	Number of 1st births	Exposure to 2nd birth risks (person-months)	Number of 2nd births	Exposure to 3rd birth risks (person-months)	Number of 3rd births	Exposure to 1st birth risks (person-months)	Number of 1st births	Exposure to 2nd birth risks (person-months)	Number of 2nd births	Exposure to 3rd birth risks (person-months)	Number of 3rd births
Age at 1st birth												
15–19	44,966	123	7,205	60	9,892	16	34,658	131	8,160	52	6,531	16
20–24	27,570	389	42,390	278	55,015	42	18,545	252	26,742	153	25,186	18
25–29	9,206	158	20,386	120	24,587	17	5,739	67	7,993	37	5,826	4
30+	11,629	41	7,052	14	2,930	0	5,093	12	2,001	2	291	0
Time since 1st or 2nd birth												
<1 year			8,261	51	5,597	8			5,410	19	2,877	4
1–2 years			14,305	129	10,752	17			9,166	78	5,363	12
3–4 years			11,016	118	10,297	14			6,911	59	4,789	9
5–9 years			18,610	141	23,560	32			11,718	68	10,087	9
10+ years			24,841	33	42,218	4			11,691	20	14,718	4
Birth cohort												
Before 1930	12,191	72	6,715	53	10,335	12	1,704	10	601	10	1,602	4
1930–39	27,112	195	22,654	133	28,152	21	3,109	22	2,266	17	3,066	5
1940–49	19,199	149	15,574	107	22,397	15	5,051	41	5,558	24	4,956	4
1950–59	21,143	167	18,800	114	23,122	18	13,366	111	11,889	79	16,144	13
1960–69	9,764	97	10,957	52	7,771	8	13,259	118	13,733	64	9,397	4
1970–79	3,297	27	2,273	11	606	0	19,032	134	9,952	46	2,627	7
1980+	665	4	60	2	41	1	8,514	26	897	4	42	1
Partnership status												
No partner	76,440	112	12,365	11	9,310	3	52,528	105	9,913	9	4,441	3
Cohabiting	3,046	88	3,905	25	3,594	10	4,526	108	3,965	30	1,516	8
Married	13,885	511	60,763	436	79,520	62	6,981	249	31,018	205	31,877	27

Table A-2: (Continued)

Variables	1st generation Russians in Estonia						2nd+ generation Russians in Estonia					
	Exposure to 1st birth risks (person-months)	Number of 1st births	Exposure to 2nd birth risks (person-months)	Number of 2nd births	Exposure to 3rd birth risks (person-months)	Number of 3rd births	Exposure to 1st birth risks (person-months)	Number of 1st births	Exposure to 2nd birth risks (person-months)	Number of 2nd births	Exposure to 3rd birth risks (person-months)	Number of 3rd births
Number of siblings												
0	12,599	81	9,434	47	8,569	10	14,250	87	8,155	43	6,591	5
1–2	49,245	367	42,773	221	44,375	24	41,953	312	32,288	150	22,631	18
3+	31,527	263	24,826	204	39,480	41	7,832	63	4,453	51	8,612	15
Educational status												
Enrolled	41,473	125	4,085	27	3,640	3	31,470	96	2,729	16	1,940	5
ISCED 1–2	19,642	165	17,061	115	21,815	31	6,324	53	4,219	38	5,201	11
ISCED 3–4	26,447	341	40,937	260	52,473	37	22,540	284	32,272	162	25,646	20
ISCED 5+	5,809	80	14,950	70	14,496	4	3,701	29	5,676	28	5,047	2
Migration history												
Urban	38,117	308	34,669	195	37,481	25	55,658	392	39,211	194	29,465	26
Rural to urban	50,611	374	40,374	253	51,330	42	4,065	33	3,485	22	4,250	3
Urban to rural	1,323	11	924	8	872	3	1,098	15	926	11	1,510	5
Rural	3,320	18	1,066	16	2,741	5	3,214	22	1,274	17	2,609	4
Mixed Estonian-Russian parentage												
Yes	2,209	17	1,435	13	2,295	3	2,813	28	2,469	21	3,224	4
No	91,162	694	75,598	459	90,129	72	61,222	434	42,427	223	34,610	34
Estonian-language school												
Yes	1,348	7	968	3	431	1	6,074	32	1,818	20	2,407	7
No	92,023	704	76,065	469	91,993	74	57,961	430	43,078	224	35,427	31
Proportion of Estonians in municipality of residence												
0-29%	58,840	365	48,823	358	57,185	53	22,346	173	18,553	101	14,220	15
30-69%	28,318	284	23,923	93	29,803	14	32,036	223	20,473	108	18,262	9
70+%	6,213	62	4,287	21	5,436	8	9,653	66	5,870	35	5,352	14

Table A-2: (Continued)

Variables	1st generation Russians in Estonia						2nd+ generation Russians in Estonia					
	Exposure to 1st birth risks (person-months)	Number of 1st births	Exposure to 2nd birth risks (person-months)	Number of 2nd births	Exposure to 3rd birth risks (person-months)	Number of 3rd births	Exposure to 1st birth risks (person-months)	Number of 1st births	Exposure to 2nd birth risks (person-months)	Number of 2nd births	Exposure to 3rd birth risks (person-months)	Number of 3rd births
Age at 1st birth												
15–19	187,851	643	26,689	350	37,426	168	322,294	1,379	86,081	619	88,489	178
20–24	111,721	1 342	98,533	1,110	151,130	420	163,920	2,450	262,070	1,602	273,889	331
25–29	47,353	527	53,330	362	58,040	92	63,709	732	100,905	429	80,697	54
30+	46,134	221	31,800	101	17,037	15	73,986	297	55,719	64	10,410	7
Time since 1st or 2nd birth												
<1 year			30,460	431	22,212	121			56,024	310	31,912	69
1–2 years			43,505	687	38,642	222			95,117	774	59,167	153
3–4 years			29,959	382	33,259	117			73,824	691	54,273	133
5–9 years			47,995	329	69,286	174			125,602	745	119,628	179
10+ years			58,433	94	100,234	61			154,208	194	188,505	36
Birth cohort												
Before 1930	36,676	189	19,017	128	20,400	51	57,275	316	32,377	214	36,072	73
1930–39	75,018	464	46,709	325	55,586	114	114,876	848	100,648	532	101,439	137
1940–49	65,434	478	42,005	362	63,080	126	95,969	713	89,123	435	87,715	83
1950–59	61,826	530	41,745	412	62,373	167	138,499	1,138	128,652	754	138,639	171
1960-69	63,817	543	34,975	424	46,828	176	99,673	920	92,756	521	75,739	82
1970–79	71,120	456	23,877	256	14,983	60	82,387	775	57,491	249	13,750	24
1980+	19,168	73	2,024	16	383	1	35,230	148	3,728	9	131	0
Partnership status												
Enrolled	320,778	859	50,377	94	31,787	35	512,709	1,264	129,974	178	71,959	49
Cohabiting	35,881	927	32,564	392	27,801	138	30,040	814	38,902	254	19,581	60
Married	36,400	947	127,411	1,437	204,045	522	81,160	2,780	335,899	2,282	361,945	461

Table A-2: (Continued)

Variables	1st generation Russians in Estonia						2nd+ generation Russians in Estonia					
	Exposure to 1st birth risks (person-months)	Number of 1st births	Exposure to 2nd birth risks (person-months)	Number of 2nd births	Exposure to 3rd birth risks (person-months)	Number of 3rd births	Exposure to 1st birth risks (person-months)	Number of 1st births	Exposure to 2nd birth risks (person-months)	Number of 2nd births	Exposure to 3rd birth risks (person-months)	Number of 3rd births
Number of siblings												
0	56,585	380	32,463	256	36,662	80	97,641	691	81,750	320	52,697	57
1–2	220,983	1,510	112,585	1,050	145,511	343	341,956	2,689	272,447	1,419	232,725	251
3+	115,491	843	65,304	617	81,460	272	184,312	1,478	150,578	975	168,063	262
Educational status												
Enrolled	196,021	696	22,178	247	25,681	89	372,802	1,842	55,842	396	17,918	50
ISCED 1–2	70,634	550	47,011	396	50,738	195	37,701	368	70,629	464	98,035	189
ISCED 3–4	98,856	1,227	109,861	1,021	145,245	346	105,798	1,410	170,786	946	157,056	206
ISCED 5+	27,548	260	31,302	259	41,969	65	93,825	1,094	189,207	810	161,575	105
Migration history												
Urban	143,075	891	73,385	570	80,625	142	348,082	2,435	278,861	1,130	189,614	180
Rural to urban	110,696	686	63,449	461	75,470	130	147,898	1,116	123,516	665	127,714	105
Urban to rural	39,328	335	19,760	253	27,086	121	23,404	234	18,121	168	23,849	47
Rural	99,960	821	53,758	639	80,452	302	104,525	1,073	84,277	751	112,308	238

Source: Estonian and Russian GGS, authors' calculations.

Table A3: Hazard ratios for control variables based on final model (M5). Russians in Estonia, sending and host populations, female birth cohorts 1924–1987

Variables	First birth	Second birth	Third birth
Birth cohort			
1924–1929	0.66***	1.05	1.28**
1930–1939	0.86***	0.86***	0.91
1940–1949	0.95	0.85***	0.79***
1950–1959 (ref)	1	1	1
1960–1969	1.09**	0.88***	0.85*
1970–1979	0.74***	0.54***	0.58***
1980–1987	0.46***	0.31***	0.44
Partnership status			
No partner	0.07***	0.23***	0.65***
Cohabiting	0.82***	1.16***	1.83***
Married (ref)	1	1	1
Age at first birth			
15–19 (ref)	na	1	1
20–24	na	0.77***	0.69***
25–29	na	0.57***	0.43***
30+	na	0.23***	0.29***
Number of siblings			
0	1.11***	1.11**	0.96
1–2 (ref)	1	1	1
3+	1.17***	1.25***	1.29***
Education			
Enrolled in education	0.66***	0.85***	1.09
ISCED1–2	0.90***	1.07*	1.45***
ISCED3–4 (ref)	1	1	1
ISCED5–6	0.94*	1.00	0.72***
Migration history			
Urban (ref)	1	1	1
Rural to urban	1.04	1.11***	0.85*
Urban to rural	1.18***	1.61***	2.02***
Rural	1.42***	1.65***	1.76***

Note: ***p<0.01; **p<0.05; * p<0.1.
Hazard ratios for control variables based on other models are available from the authors on request.
Source: Estonian and Russian GGS, authors' calculations.