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Master Thesis

The transition into motherhood from a life-course perspective:

A comparison across first-generation immigrants in Germany

Supervisors:

Dr. Roberta Rutigliano (University of Groningen)
Prof. Dr. Thomas Leopold (University of Cologne)

Contributor:

Name: Leonie Diffené
Master program: M.Sc. Population Studies
Student number: S4900715
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Abstract

Previous research has examined when and why immigrant women living in Germany become mothers, provided they came from former guest-worker countries. However, less is known about the fertility behavior of other groups of international immigrants in Germany. This study investigates the transition to motherhood across first-generation immigrant women from three different regions of origin who were childless before migrating to Germany in 1990 or later. The objective is to examine the extent to which immigrants from Central and Eastern European (CEE) or non-European countries might be more likely to have a first birth than Western European immigrants and what factors could explain these differences. Following the socialization and selection hypotheses of the life-course approach, I expected that CEE and non-European migrants had higher first-birth risks than Western European migrants as they self-selected into different socio-demographic characteristics and immigrated at different ages. Using longitudinal data from the German Socio-Economic Panel, I first employed discrete-time event-history models to estimate the effects of the region of origin on the predicted probability of having a first birth. Second, I used the Karlson/Holm/Breen method to test whether socio-demographic characteristics and the age at migration mediated the region of origin effects. Results suggest that, on average, CEE and non-European immigrants had higher first-birth risks partly because they were less educated and younger at the time of migration compared with Western European migrants. It can be concluded that immigrants' transition to motherhood is related to their socialization context and selective socio-economic characteristics.

Keywords: Transition to motherhood, international immigrants, life-course approach, discrete-time event-history analysis, Karlson/Holm/Breen method

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List of Abbreviations

AME	Average marginal effect
CASMIN	Comparative Analysis of Social Mobility in Industrial Nations
CEE	Central and Eastern Europe
CFR	Completed fertility rate
CI	Confidence interval
EHA	Event-history analysis
EU	European Union
H1/2/3/4	Hypothesis 1/2/3/4
IT	Information technology
KHB	Karlson/Holm/Breen
MAC	Mean age at childbirth
MAM	Mean age at motherhood
Max	Maximum
MEM	Marginal effect at the means
Min	Minimum
M1/2/3/4	Model 1/2/3/4
n	Number of persons
N	Number of person-years (observations)
NLPM	Non-linear probability model
RQ1/2	Research question 1/2
SD	Standard deviation
SDT	Second demographic transition
SOEP	German Socio-Economic Panel
TFR	Total fertility rate
USA	United States of America
v36	Wave 36

1. Introduction

Problem statement

Over the past two decades, the number of foreign-born people living in Germany has almost doubled from about 5.7 million in 2000 to 10.3 million in 2021 (Destatis, 2022c). Yet, not only the size of the foreign-born population has changed but also their composition. Between 1955 and the late 1980s, most immigrants came to Germany either as relatively low-skilled guest workers from the former labor recruitment countries, as their family members or as ethnic Germans from the former Soviet Union who often had no qualifications recognized in Germany. Since the 1990s, migration patterns to Germany have changed as different people have migrated from different regions of origin. First, the immigration of relatively well-educated citizens of the Western European Union (EU) has increased, especially since the financial crisis in 2008. Second, the Eastern EU enlargements have made Germany an increasingly popular destination for migrants from the new EU Member States in Central and Eastern Europe (CEE). Third, EU initiatives such as the Blue Card have enabled many young and skilled people from non-European countries to migrate to Germany. Also, less skilled non-European migrants entered Germany as family members in the context of the European refugee crisis. As the composition of the foreign-born population has changed, so has immigrant fertility in Germany. Between 2011 and 2019, the period total fertility rate (TFR) of foreign-born nationals living in Germany increased by almost 0.5 children per woman, from 1.58 in 2011 to 2.06 in 2019 (BIB, 2021). The concurrent changes in fertility and immigration patterns suggest that immigrant fertility may be related to the composition of immigrants.

Previous research examining the relationship between fertility and international migration from a life-course perspective highlighted that immigrants' childbearing behavior differs depending on their place of origin, age at migration and socio-demographic characteristics (Kulu et al., 2019). The so-called socialization hypothesis assumes that migrants from different places of origin were socialized in distinct fertility contexts and continue to reflect their socialization context in the destination country. Moreover, this hypothesis expects that the older migrants are at the time of migration, the more or earlier they have children in the destination country if they were socialized in a context where birth rates are relatively high, or the mean age at childbearing is relatively low. In contrast, the selection hypothesis expects that differences in immigrant fertility are due to differences in socio-demographic characteristics that are also related to fertility. In the case of Germany, previous research has mainly focused on the childbearing behavior of immigrants from former guest-worker countries (such as Greece, Italy, Spain, Turkey, and Yugoslavia), many of whom arrived before the 1990s (e.g., Krapf & Wolf, 2015; Mayer & Riphahn, 2000; Milewski, 2007, 2010a, 2010b; Schmid & Kohls, 2009; Wolf, 2014, 2016). However, less research has been conducted on the fertility of immigrants from other regions of origin who have migrated to Germany more recently. While there is evidence that compared to Western European migrants, the risk of having a first birth in Germany is elevated by 23% among women born in CEE, 149% among those from Africa and the Middle East, and 34% among those from America, Asia and Oceania, it remains to be clarified if and how much of these group differences can be attributed to socialization effects in terms of the age at migration and selection effects in terms of socio-demographic characteristics (Wolf & Kreyenfeld, 2020).

Research objectives and questions

In order to contribute to this literature, the present work focuses on first-generation immigrant women (foreign-born individuals who immigrated after childhood) who were childless before the year they arrived in Germany in 1990 or later. Based on the life-course approach, the study aims to compare these immigrants from different regions of origin in their transition to motherhood. The timing of the first birth is distinct from that of higher-order births. For example, immigrants from CEE appear to be more likely to transition to a first birth rather than a higher-order birth than Western European immigrants in Germany, as they were socialized in a fertility context where people often have only one child but have it relatively early in life (Wolf & Kreyenfeld, 2020). Against this backdrop, this study first examines the extent to which first-generation immigrant women from different regions of origin living in Germany differ in their transition to motherhood (RQ1). Based on the socialization hypothesis, I expect that migrants from CEE and non-European countries are more likely to have a first birth compared to Western European immigrants. Secondly, this work examines what factors could explain these potential differences across immigrants from different regions of origin in their transition to motherhood (RQ2). The focus is on socio-demographic characteristics (selection hypothesis) and the age at migration (socialization hypothesis).

Structure of the thesis

To address these two research questions, this work proceeds as follows. The following chapter first reviews the life-course approach to migrant fertility, focusing on the socialization and selection hypotheses. The second section in this chapter discusses how migration patterns to Germany have changed since the mid-1950s to illustrate how migrant groups included in this study differ from those examined by previous research. To link the changing migrant composition to the transition to motherhood, the third section in this chapter discusses to what extent immigrants from different regions of origin can be expected to reflect their socialization context in Germany. I test the resulting hypotheses using longitudinal data from the German Socio-Economic Panel. To examine how and why immigrants from different regions of origin might differ in their first-birth risks, I conduct discrete-time event-history analyses using logistic regression, followed by mediation analyses based on the Karlson/Holm/Breen method. The final chapter discusses the main findings, highlights their limitations and strengths, and provides future research and policy recommendations.

2. Theoretical framework and literature

2.1 The life-course approach to migrant fertility

This study draws on the life-course approach to examine differences across immigrant groups in their transition to motherhood. Researchers from various fields have used this approach to explain the timing and sequencing of events in an individual's life (Kulu et al., 2019). Accordingly, an individual's life course is composed of several trajectories or careers in areas such as migration, education, work or family (Mulder, 2022). Each trajectory is marked by different, often interrelated events, indicating the transition from one state into another. For example, moving from one country to another constitutes an event in an individual's migration trajectory that may also affect their educational, work, and family life. While the approach focuses on the micro-level, it considers that an individual's life course is embedded in historical time and place on the macro-level and linked to other people's lives on the meso level.

Five contradictory yet complementary life-course hypotheses

Concerning the relationship between migration and fertility, previous research has put forward several life-course hypotheses that are both contradictory and complementary (Kulu et al., 2019; Kulu & Milewski, 2007). They can be divided into short-term and long-term perspectives. In the short run, the migration process can either disrupt or promote childbearing. According to the *disruption hypothesis*, migrants are less likely to have a child either shortly before or after the migration if they anticipate the move or if the migration process involves spousal separation or other disruptive experiences. In contrast, the *interrelation hypothesis* predicts that migration has a fertility-increasing effect shortly after arrival. One explanation is that migrants catch up on childbearing at the destination if they had postponed it before the migration (Lübke, 2015). Another explanation, also known as the *selection hypothesis*, does not assume that the migration process leads to a genuine change in fertility behavior. Instead, migrants are a selective group in terms of observed (socio-demographic) or unobserved (fertility preferences) characteristics. These characteristics contribute to their fertility behavior in the destination country, regardless of the impact of the migration process itself (Wolf, 2014). For example, migrants may have lower levels of education than non-migrants, and lower levels of education may be associated with higher fertility. In addition, migrants may use migration as a strategy to realize their fertility preferences. For example, if they feel relatively disadvantaged and think they cannot afford to have children in their country of origin, they could move to another country where they find a standard of living that provides better conditions to raise children (Marczak et al., 2018). This example illustrates that migration and fertility are not fully exogenous, as fertility intentions can motivate migration, which in turn can influence fertility behavior. Unlike the other hypotheses, the selection hypothesis is suitable to explain migrant fertility regardless of the migration timing and is thus not limited to the short term. In the long run, the childbearing behavior of immigrants may reflect fertility patterns typical of either the destination or origin country (Kulu et al., 2019; Kulu & Milewski, 2007). According to the *adaptation hypothesis*, migrants' childbearing behavior converges with that of the native population in the destination country with increasing duration of stay. This is because immigrants adapt to their new socioeconomic and cultural environment, taking on the fertility norms of the native population. In contrast, the *socialization hypothesis* (also known as the assimilation hypothesis) expects that immigrants exhibit fertility patterns similar to those in their home country even years after immigration (Kulu, 2006). The underlying assumption is that the socio-cultural environment in the origin country shapes future migrants' fertility norms already in childhood and early adolescence. These values remain relatively stable throughout life and guide subsequent fertility behavior. The hypothesis also assumes that fertility norms are homogeneous within the socialization context so that a country of origin with high birth rates, for example, provides the same high fertility context for everyone growing up in that country.

Empirical strategies for testing the five life-course hypotheses

Empirical studies applying the life-course approach to the relationship between migration and fertility can be distinguished along several dimensions. First, concerning the *fertility outcome*, researchers have either studied the quantum of fertility (that is, how many children an individual has, on average) or considered the timing of fertility by examining if and when individuals transition to the first, second or third child. In terms of the fertility quantum, scholars often used indicators such as the completed fertility rate (CFR) (e.g., Cygan-Rehm, 2014), the TFR (e.g., Tønnessen & Mussino, 2020), or the total number of children in the household (e.g., Cantalini & Panichella, 2019). Researchers more interested in the timing of fertility typically considered the age at first or higher-order birth (e.g., Kreyenfeld & Krapf, 2017). The second dimension refers to different *migrant groups*. On the one hand, migrants can be divided into the first generation (foreign-born individuals who immigrated after childhood), the 1.5 generation (foreign-born individuals who immigrated during childhood) or the second generation (individuals who immigrated not themselves but their parents) (Krapf & Wolf, 2015; Milewski, 2007). Empirically, age 15 is usually used as the threshold of childhood. In the case of Germany, migrants who arrived before age 15 are treated as the 1.5 generation, as they most likely have attended school in Germany and were thus exposed to German culture at a relatively young age. On the other hand, different groups of migrants can also be defined by their place of origin, such as the country or region of birth (e.g., Andersson, 2004). The third dimension underscores that migrant fertility can be contrasted with different *comparison groups*. For example, fertility outcomes can be compared (1) between different migrant groups (e.g., Wolf & Kreyenfeld, 2020 if migrant groups are defined by regions of origin; Milewski, 2010a if groups are defined by generations), (2) within a single migrant group regarding different migrant characteristics such as the reason for migration (e.g., Wolf, 2016), or (3) migrant fertility is related to that of stayers in the origin country (e.g., Lübke, 2015) or natives in the destination country (e.g., Pailhé, 2017).

This categorization helps to understand how empirical studies have tested each hypothesis. As the *disruption* and *interrelation hypotheses* address the short-term effects of the migration process, researchers examining these hypotheses have usually focused on first-generation immigrants to look at their fertility a few years before, during and after the migration (e.g., Wolf, 2016). Although natives were often used as a comparison group, the two hypotheses are best examined by comparing migrants with stayers at home (e.g., Baykara-Krumme & Milewski, 2017). The interrelation hypothesis has also been tested by examining the timing of marriage and how it is related to migration and childbirth (e.g., Milewski, 2010a). Concerning the *selection hypothesis*, scholars measured observed characteristics based on socio-demographic characteristics such as education. Moreover, they used the reason for migration, marital status before or at migration, or marriage duration as proxies for unobserved characteristics like fertility preferences (e.g., Wolf, 2014). These characteristics were then introduced as mediators in the relationship between migrant status and fertility to test whether they could partly explain or reduce fertility differences between migrants and the group of comparison (e.g., Gabrielli et al., 2007). Researchers who tested the *adaptation hypothesis* commonly used the time since immigration to examine if migrant fertility narrows to native levels with increasing duration of stay (e.g., Tønnessen & Mussino, 2020). In contrast, there are different approaches to studying the *socialization hypothesis*. One approach considers that first-generation immigrants from different places of birth have experienced different socialization contexts (e.g., Cygan-Rehm, 2014). Thus, there is evidence for the socialization hypothesis if fertility outcomes differ by immigrants' region or country of origin. However, it should be noted that these place-specific indicators merely provide a proxy for socialization, as they do not explicitly capture the transmission of values. Also, unobserved macro-level factors such as the economic or political situation may contribute to fertility differences between migrants from different places of origin. Another approach to the socialization hypothesis tests if migrants who immigrated at older ages exhibit higher fertility levels in the destination country than those who arrived earlier (e.g., Adsera & Ferrer, 2011). The hypothesis assumes that the former group of migrants has been exposed to the fertility norms in the place of origin for a longer period than the latter group and that the fertility context in the origin country is higher than that in the receiving country.

Empirical evidence on the fertility of immigrants in Western European countries

Depending on the context in which migrant fertility is studied, empirical results have provided evidence for each hypothesis. In the context of international migration to European countries, most studies supported the *interrelation* rather than the *disruption hypothesis* (Majelantle & Navaneetham, 2013). For example, research showed that in Nordic countries like Sweden, first-generation migrant women exhibited first-birth risks elevated by 91% in the first year after arrival compared to Swedish-born women or 1.5-generation immigrants (Andersson, 2004). These arrival effects diminished after six years, supporting the *adaptation hypothesis*. Moreover, these effects differed depending on the country of origin. The smallest arrival effects were found for migrants from Western Europe and countries like the United States of America (USA), Australia and Canada. For African migrants, strong arrival effects were not only observed in Sweden but also in other European destinations such as France (Toulemon, 2004), Italy (Mussino & Strozza, 2012), and Spain (Castro-Martín & Rosero-Bixby, 2011). In contrast, when the *socialization hypothesis* is tested based on the age at migration, empirical findings did not necessarily support the expectation of a positive linear relationship with fertility. Compared to migrants who migrated before the age of 20, the risk of having a first birth in Italy was 10% higher for migrants who arrived between the ages of 20 and 24 but lower for those who migrated at age 25 or older (Mussino & Strozza, 2012). Furthermore, migrants appear to be a *selective* group in many European destinations (e.g., Italy: Gabrielli et al., 2007; Spain: González-Ferrer et al., 2017; United Kingdom: Lübke, 2015; Switzerland: Guarin & Bernardi, 2015; France: Pailhé, 2017; Norway: Tønnessen & Mussino, 2020). Accordingly, their fertility differences compared to other groups diminished if the reason for immigration or socio-demographic characteristics were considered. Specifically, increased migrant fertility was associated with migration for family reasons, lower levels of education, older birth cohorts, unemployment, being religious or Muslim, and having a partner or spouse.

Empirical evidence on the fertility of immigrants in Germany

Similar fertility patterns can be observed for immigrants in Germany. While the childbearing behavior of second-generation immigrants has been less researched, Table 1 summarizes studies that included foreign-born immigrants in Germany (Krapf & Wolf, 2015). First, there is little support for the *disruption hypothesis*. For example, only among ethnic Germans did fertility tend to decline in the first years after arrival (Dinkel & Lebok, 1997). A more consistent finding from the German literature is that compared to West

German natives or other migrant groups, immigrants exhibited increased fertility levels shortly after the migration (*interrelation hypothesis*), reducing with increasing duration of stay (*adaptation hypothesis*) (Kreyenfeld & Krapf, 2017; Mayer & Riphahn, 2000; Milewski, 2007, 2010a; Wolf, 2014, 2016; Wolf & Kreyenfeld, 2020).

Furthermore, fertility differences between immigrants and their comparison group are (1) because migration, marriage and childbirth constitute interrelated events, (2) due to socialization effects, and (3) because immigrants represent a selective group (Cygan-Rehm, 2014; Erman, 2021; Krapf & Wolf, 2015; Kreyenfeld & Krapf, 2017; Mayer & Riphahn, 2000; Milewski, 2007, 2010a, 2010b; Schmid & Kohls, 2009; Wolf, 2014; Wolf, 2016; Wolf & Kreyenfeld, 2020). First, regarding the *interrelation hypothesis*, there is evidence that first-generation immigrants from Africa and the Middle East had, on average, particularly high first-birth risks in the first and second years after they arrived in Germany (Wolf & Kreyenfeld, 2020). In contrast, such arrival effects were not observed for CEE or Western European migrants. Second, concerning the *socialization hypothesis*, studies often focused on Turkey as the only country of origin, or they included several former guest-worker countries, such as Turkey, Greece, Italy, Spain and the former Yugoslavia (Croatia, Bosnia Herzegovina, Macedonia, Slovenia). Results suggested no significant differences in the transition to motherhood between these countries of origin if the duration of stay and duration of marriage were taken into account (Milewski, 2007, 2010a). Only for higher-order birth risks, first-generation immigrants from Turkey had 21% higher second and 73% higher third birth risks compared to West German women. One of the few studies that considered more recent migrants who moved to Germany since the 1990s revealed significant fertility differences across first-generation immigrant women from different regions of origin (Wolf & Kreyenfeld, 2020). Compared with Western European migrants, first-birth risks were elevated by 23% among CEE migrants, 149% among those from Africa and the Middle East, and 34% among women born in America, Asia or Oceania. However, the increased fertility levels of CEE migrants did not apply to higher-order birth risks, as these were 41% lower for second births and 20% lower for third births compared to Western European migrants. While the authors argued that CEE migrants were socialized in a context where it is common to have only one child but that one relatively early in life, they did not empirically test whether proxies of migrants' exposure to this context, such as the age at migration, account for their increased first-birth risks. Consistent with the highly elevated first and higher-order birth risks of migrants from high fertility contexts such as Africa or the Middle East, other research showed that immigrants' completed fertility increased on average by 0.5 children with every one-unit increase in the home country's TFR (Cygan-Rehm, 2014). Like in the European literature, results for the age at migration did not always point to a positive relationship with the fertility outcome, as the socialization hypothesis would expect. For example, there is evidence that Turkish migrants' first-birth risks were reduced if they immigrated at an older age compared to those who arrived between the ages of 15 and 19 or between 20 and 24 years (Wolf, 2014, 2016). However, other findings revealed that immigrants' completed number of children appeared to be higher if they arrived after age 28 than if they migrated earlier in life (Mayer & Riphahn, 2000). Third, evidence of the *selection hypothesis* arises from studies showing that socio-demographics partly explained fertility differences between migrants and their comparison group. For example, differences in the first-birth risks between immigrants from different regions of origin were partly reduced once religious affiliation was taken into account, although education did little to reduce these differences (Wolf & Kreyenfeld, 2020). Concerning the relationship between socio-demographic characteristics and childbearing, immigrant fertility tends to be lower for more educated migrants and higher for unemployed, married, or Muslim migrants (compared to less educated, employed, single or Christian migrants) (Cygan-

Rehm, 2014; Erman, 2021; Kreyenfeld & Krapf, 2017, Milewski, 2007, 2010a, 2010b; Schmid & Kohls, 2009; Wolf & Kreyenfeld, 2020). For birth cohort effects, there are mixed findings, showing negative, positive and insignificant effects on the timing or quantum of fertility. Some studies found that newer birth cohorts exhibited lower first and second-birth risks or CFRs than older cohorts (Krapf & Wolf, 2015; Schmid & Kohls, 2009). Other findings revealed that migrants born in different periods did not significantly differ in their first-birth risks, whereas second and third-birth risks were higher for newer than older cohorts (Wolf, 2014; Milewski, 2007, 2010a, 2010b).

In summary, this review has shown that previous studies have explored the fertility behavior of immigrants in Germany in several ways. Most of them focused on (female) migrants from former guest-worker countries, many of whom migrated before the 1990s. However, the fertility of more recent migrant groups from other countries of origin has been less researched. First, given that in the origin countries as well, there has been (or still is) (1) a transition toward lower birth rates and higher mean ages at childbearing and (2) a shift towards higher levels of education, it can be expected that the fertility of more recent immigrant groups differs from that of older ones. For example, there is evidence that first-birth risks are reduced among migrants from Southern European guest-worker countries if they arrived in Germany after 1990 compared to those who immigrated before that period (Erman, 2021). Indeed, these differences were due to the higher educational levels of the more recent arrival group. Second, the geographic focus on former guest-worker countries neglects the number of immigrants who have increasingly migrated to Germany from other regions since the 1990s. Although researchers have already compared the transition to first and higher-order births across more recent first-generation immigrant women from Western Europe, CEE, Africa or the Middle East and other regions, they focused on arrival effects, selection into socio-demographic characteristics (including religious affiliation and education) and circular migration to explain fertility differences by regions of origin (Wolf & Kreyenfeld, 2020). However, they did not consider the age at migration or other socio-demographic characteristics such as birth cohort and partnership status. Also, their study population included refugees, although they might have different motives for migration and childbearing than migrants. Against this backdrop, this work aims to shed light on the socialization and selection hypotheses by comparing first-generation immigrant women from different regions of origin who migrated childless to Germany since the 1990s regarding their transition to first birth, taking age at migration and socio-demographic characteristics into account. As CEE migrants showed higher first but lower higher-order birth risks than Western European immigrants, this finding highlights that the transition to the first birth is a particular fertility outcome (Wolf & Kreyenfeld, 2020). It marks the entry into parenthood but is not necessarily connected to further childbearing. Moreover, the following section illustrates that focusing on first-generation immigrant women considers the change in the composition of migrants who moved to Germany since the 1990s.

Table 1: Overview of selected life-course studies on the relationship between international migration and fertility in Germany

Reference	Generation of immigrants	Immigrant origin	Fertility outcome	Comparison group	Finding
Cygan-Rehm (2014)	First	50 countries	Quantum (completed fertility)	West German natives without migration background, immigrants	Socialization, selection
Dinkel & Lebok (1997)	First	German ethnic	Quantum (relative fertility index)	German natives	Disruption
Erman (2021)	First	Turkey, Greece, Italy, Spain, former Yugoslavia	Timing (first, second, third birth)	Turkish immigrants (arrival in 1955–1973)	Selection, adaptation, socialization
Krapf & Wolf (2015)	1.5, second	Turkey	Timing (first, second birth)	West German natives without migration background	Socialization, adaptation, selection
Kreyenfeld & Krapf (2017)	First	Turkey	Timing (first birth)	German ethnic immigrants	Interrelation, adaptation
Mayer & Riphahn (2000)	First, 1.5	Turkey, Greece, Italy, Spain, former Yugoslavia	Quantum (completed fertility)	West German natives	Adaptation, socialization
Milewski (2007)	First, second	Turkey, Greece, Italy, Spain, former Yugoslavia	Timing (first birth)	West German natives	Interrelation, selection, adaptation, socialization
Milewski (2010a)	First, second	Turkey, Greece, Italy, Spain, former Yugoslavia	Timing (first, second, third birth)	West German natives	Interrelation, selection, adaptation, socialization
Milewski (2010b)	First, second	Turkey, Greece, Italy, Spain, former Yugoslavia	Timing (second, third birth)	West German natives	Socialization, selection, adaptation
Schmid & Kohls (2009)	No distinction	Turkey, Greece, Italy, Poland, former Yugoslavia	Quantum (completed fertility rate)	Polish immigrants	Interrelation, selection, adaptation, socialization
Wolf (2014)	First	Turkey	Timing (first, higher-order birth)	West German natives	Interrelation, (pre-migration) disruption, selection, adaptation
Wolf (2016)	First	Turkey	Timing (first, second birth)	Marriage immigrants	Interrelation, (pre-migration) disruption, selection, adaptation
Wolf & Kreyenfeld (2020)	First	Western Europe, Central and Eastern Europe (EU, German ethnic, third country), Africa and the Middle East, Other	Timing (first, second, third birth)	Immigrants from Western European countries; EU migrants	Interrelation, selection, socialization, adaptation

Note: Own illustration.

2.2 European migration and the case of Germany

Migration to countries like Germany can be divided into different historical phases, with economic and political crises often marking the beginning of a new phase. For the period between the 1950s and 2012, previous research distinguished three phases of European migration that also apply to the German context: the "guest worker schemes" (1950s-1974), the "oil crisis and migration control" (1974-1980s), and "migration towards and within Europe" (1990s-2012) (van Mol & de Valk, 2016). With the onset of the refugee crisis in 2014, one could assume a fourth phase in which immigrants' countries of origin have diversified (BIB, 2021). From this historical perspective, the economic and political context should be considered, as well as the public discourse towards immigration. The way immigrants are perceived and received by the German population has changed over time, contributing to changes in migration policies (Ratzmann & Bauer, 2020). Migration policies, in turn, influence the number and composition of people entering the country, as they are often selective towards certain migrant groups. Hence, from a more demographic perspective, migration to Germany can be distinguished according to immigrants' socio-economic characteristics as well as the type of international immigration (van Mol & de Valk, 2016). As this study focuses on migrants ("voluntary" migration) rather than refugees or asylum-seekers (forced migration), different types of immigration considered in this study include people who entered the country either in search of labor (*labor migration*), as family members of immigrants already in the country (*family reunification* and *marriage migration*) or as EU citizens (*intra-EU migration*). Moreover, in the case of Germany, people can also immigrate if they "are recognised by the German authorities as being of German descent" (*ethnic Germans* or *Aussiedler*) (Oltmer, 2006, p. 98). Based on the two historical and demographic perspectives, the following section provides an overview of migration to Germany from the mid-1950s to today, highlighting its changing character over the period.

Phase 1: The guest worker schemes from 1955 to 1973

Germany's immigration history dates back to the mid-1950s (Ratzmann & Bauer, 2020). At that time, the demand for labor increased due to the economic boom after World War II. Therefore, from 1955 onwards, the West German government (like others in Western Europe) began actively recruiting workers from Southern countries. By 1973, about 14 million guest workers had immigrated to Germany in search of labor (Ratzmann & Bauer, 2020). They accounted for 24% of the average population in Germany between 1955 and 1973 (Destatis, 2022b). Given that for each guest-worker country, the treaties were signed in different years (e.g., Italy in 1955, Spain in 1960, Greece in 1960, Turkey in 1961, Yugoslavia in 1968), about 50% of guest workers initially came from Italy in 1960, after which migration from Greece and Spain dominated in 1964 (Milewski, 2007). From the late 1960s onwards, immigration from Turkey took over. For example, with 605,000 employed persons, Turkish migrants represented the largest foreign labor population in Germany in 1973 (Rudolph, 2002). The German Democratic Republic also received guest workers from former socialist countries such as Poland and Hungary (Ratzmann & Bauer, 2020). However, the term 'guest worker' clarifies that the migrants were seen only as temporary support for the German labor market. In terms of their demographic profile, they were often male, very mobile (between the country of origin and Germany), relatively low-skilled, and of working age (Erman, 2021; Ratzmann & Bauer, 2020). They usually filled the jobs the native labor force avoided. Due to their economic contribution to the country, the native population tended to have a positive attitude toward labor migration (van Mol & de Valk, 2016). However, since the guest workers were expected to stay for only a short time, migration policies made little effort to support their integration or access to health and social systems. Finally, the lack of integration policies and a rather liberal immigration policy changed with the onset of the oil crisis in 1973 (Ratzmann & Bauer, 2020).

Phase 2: The oil crisis and migration control from 1973/74 to the late 1980s

The oil crisis reduced the demand for labor in many European receiving countries (van Mol & de Valk, 2016). As a result, their governments began to adopt more restrictive migration policies. The German government also imposed a ban on labor recruitment in 1973 (Erman, 2021). While many guest workers returned to their origin countries, others stayed and brought their families. Thus, the originally temporary planned migration shifted to a permanent stay of the guest workers and their family members. In other words, family reunification and marriage migration provided the main entry routes to Germany, with migrants' family members accounting for about 50% of total immigration to West Germany during the 1970s and 1980s (Milewski, 2007). Under the family reunification laws, "immigrant's foreign spouse and children below age 16 [are allowed] to immigrate" (Wolf, 2016, p. 733). In this process, foreign couples marry either before (family reunification) or after (marriage migration) one partner has moved to Germany. Especially among Turkish immigrant men, the latter process was and still is relatively common, as they often marry a woman who still lives in Turkey and moves to Germany after the wedding.

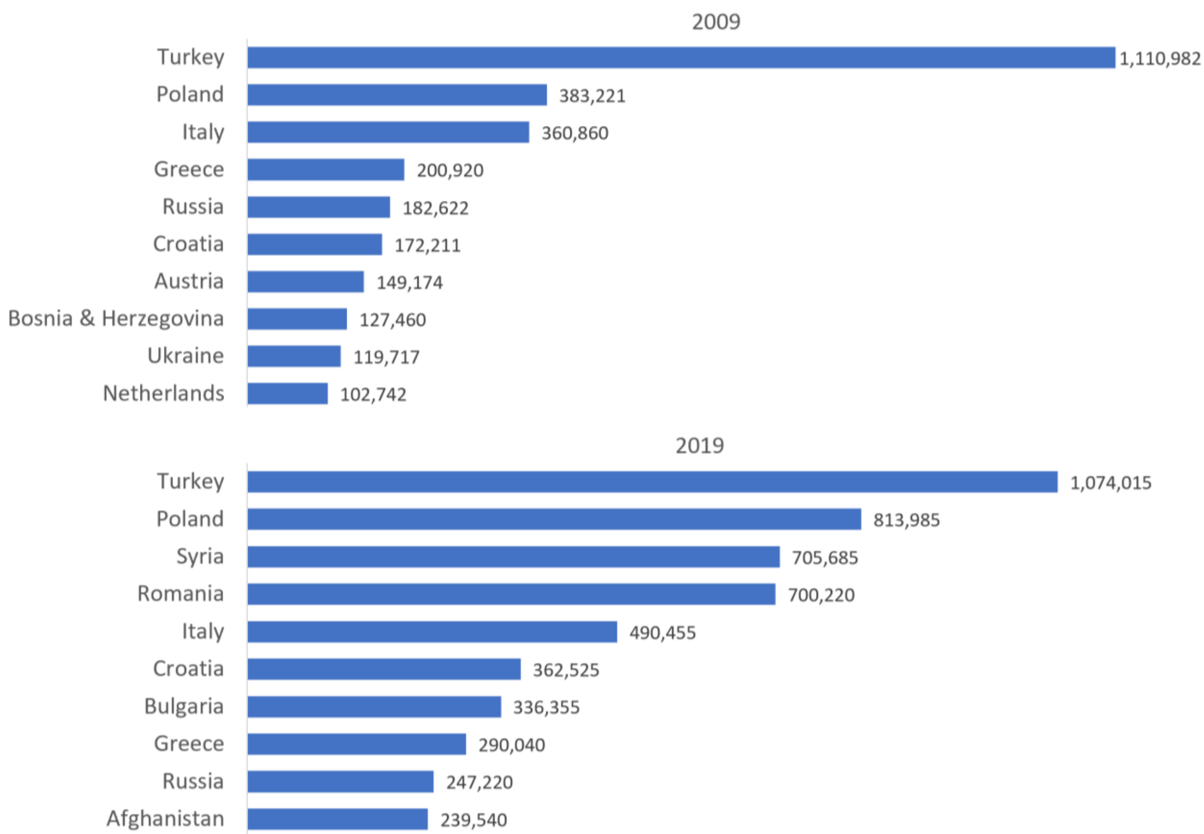
Phase 3: Migration from the EU and third countries from the 1990s to 2013

In the early 1990s, the fall of the Iron Curtain, the dissolution of the Soviet Union and the Yugoslav Wars contributed to a massive inflow of ethnic Germans (*Aussiedler*) (Ratzmann & Bauer, 2020; van Mol & de Valk, 2016). While they already contributed to immigration during the first two phases, most moved from the former Soviet Union to Germany after 1989. In 1990 alone, almost 400,000 people of German descent immigrated to Germany (Dietz, 2006). However, with the introduction of a more restrictive admission procedure and less integrative policies toward ethnic Germans, their immigration has decreased since 1994. Between 2001 and 2012, for example, the number of ethnic Germans (defined as *Spätaussiedler* if they immigrated after 1992) reduced from 98,500 to 1,800 people (BAMF, 2021a). As for their socio-demographic characteristics, ethnic Germans were, on average, not only younger than the German population throughout their immigration history but also younger than the foreign population in 2004, for example (Dietz, 2006). Moreover, they were usually better trained or educated than the former guest workers. However, since the qualifications they acquired in the former Soviet Union were often not recognized in Germany, many ethnic Germans, like the guest workers, ended up in rather low-skilled jobs.

In addition to the legal framework for ethnic Germans, the EU has played a crucial role in influencing the number and composition of people migrating to Germany since the adoption of the 1992 Maastricht Treaty (van Mol & de Valk, 2016). Accordingly, the 2005 freedom of movement arrangement stimulated international migration within the EU. In this regard, the accession of new Member States (including CEE countries like Poland in 2004, Bulgaria and Romania in 2007, and Croatia in 2013) increased migration from new to older Member States. However, as Germany only granted full freedom of movement to Romania and Bulgaria from 2014 and Croatia from 2015 onwards, the strongest increase in immigration from these three countries occurred in the fourth phase (and will therefore be discussed in the next paragraph) (Wolf & Kreyenfeld, 2020). While immigration from Poland also remarkably increased after the country was granted full freedom of movement in 2011, there were already more first-generation Polish immigrants

(283,571) living in Germany in 2000 compared to those from Croatia (166,499), Romania (87,954) or Bulgaria (33,504) (Destatis, 2022c). This is due to the bilateral agreement between Poland and Germany in 1990, which supported the labor migration of Polish nationals to Germany long before Poland joined the EU in 2004 (van Mol & de Valk, 2016). The early support of Polish (mainly seasonal) workers also explains why many Polish immigrants stayed only temporarily, were predominantly male, and between 20 and 50 years old in 2008 (van Mol & de Valk, 2016). Another noteworthy group of EU citizens entering Germany at the time consisted of young and highly educated immigrants from Southern European countries such as Italy, Spain and Greece (BIB, 2021; Erman, 2021). As they were heavily affected by the 2008 financial crisis, the EU supported their internal EU migration. Yet, migration from the former Yugoslavia also increased after 2008. Regardless of the financial crisis, the EU and Germany are generally more interested in promoting the inflow of higher rather than lower-qualified immigrants from non-EU countries. Specifically, the implementation of the German Green Card initiative in 2000 and the EU Blue Card Directive in 2012 provided one of the most important channels for non-EU workers to enter Germany if they were information technology (IT) experts or had an academic degree (Ratzmann & Bauer, 2020). Moreover, Germany is a primary destination for international students from third countries. Between 2013 and 2014, most of them came from China (26,293), Russia (10,296) and India (9,009) (SVR, 2019).

Figure 1: Number of foreign-born immigrants in Germany by the top ten foreign citizenships (2009, 2019)



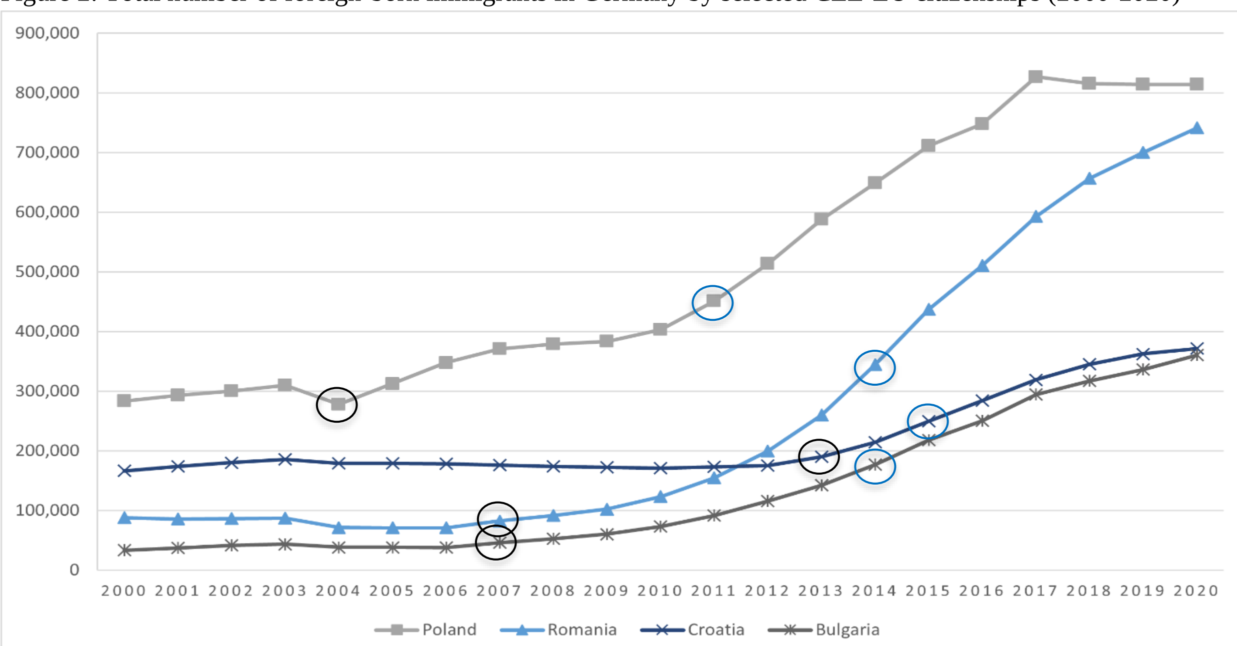
Source: Destatis (2022c), own illustration.

Looking at the ten most common foreign nationalities of foreign-born immigrants in Germany in 2009, Figure 1 shows that the largest migrant group comprised 1.1 million Turkish nationals. Other countries that were not EU members at that time (Bosnia and Herzegovina, Croatia, Russia and Ukraine) were also among the ten most common foreign citizenships. Lastly, most EU immigrants had Polish, Italian, Greek, Austrian or Dutch citizenship. This distribution of migrants' nationalities changed with the onset of the European refugee crisis.

Phase 4: The European refugee crisis and migration from CEE countries from 2014 to 2020

Due to the wars, conflicts and humanitarian crises in Syria, Afghanistan, Iraq and many African countries, Germany has seen a historic influx of refugees and asylum-seekers since 2015. In total, more than 1.2 million asylum applications were filed between 2015 and 2016 (BAMF, 2022). Most asylum-seekers originated from Syria, Afghanistan and Iraq, accounting for nearly 70% of all asylum applications in 2016 (BIB, 2021). Although this study focuses on voluntary rather than forced immigration, the increase in forced immigration is relevant to voluntary migration, as people from refugees' main countries of origin also immigrated as labor or family migrants. For example, Syrians accounted for more than 30% of all family reunifications in 2017 (SVR, 2019). Also, between 2010 and 2018, family reunifications (114,861 people) and labor immigration (60,882 people) of third-country nationals peaked in 2017 (BAMF, 2021b).

Figure 2: Total number of foreign-born immigrants in Germany by selected CEE-EU citizenships (2000-2020)



Source: Destatis (2022c), own illustration. Note: Black circles indicate the year the country joined the EU, while the blue circles signal the year the country was granted full freedom of movement.

In addition to family and labor migration, EU membership was another important channel through which "voluntary" migrants arrived in Germany during the fourth phase. After the new EU Member States in CEE were granted full freedom of movement, immigration from these countries increased significantly (Figure 2). Besides the sharp increase in Polish immigration up to 2017, Romanian and Bulgarian nationals have become two new migrant groups in Germany in recent years. Accordingly, taking into account the period after full freedom of movement was granted, the number of foreign-born immigrants in Germany has increased stronger among Romanians (2014-2020: 115%) and Bulgarians (2014-2020: 104%) than among Poles (2011-2020: 80%) or Croats (2015-2020: 49%) (Table A1 in the appendix). The sex ratio of these four countries is relatively balanced: in 2020, almost as many female (45%) as male (55%) foreign-born immigrants from these countries lived in Germany (Destatis, 2022c). Since EU citizens do not have to report their purpose of stay, it is difficult to determine their reason for immigration. Surveys suggest that most EU migrants stated that they had moved to Germany for work or family reasons (SVR, 2019, 2021). Compared to the relatively low skills of the former guest workers, the qualification levels of recent EU immigrants are more diverse. For example, in 2018, EU immigrants were more likely to have an academic degree than German natives, but many of the former group also did not have a vocational qualification.

The changing composition of foreign-born immigrants in Germany between the third and fourth migration phases can also be concluded from Figure 1 presented earlier. Unlike in 2009, Syria, Romania, Bulgaria and Afghanistan ranked among the ten most common foreign citizenships among foreign-born immigrants in Germany in 2019.[1] While Turkish nationals still represent the largest migrant group, their dominance has relatively reduced over the past decade as Polish, Syrian, and Romanian nationals increasingly account for the foreign-born population in Germany.

Summary and study focus

This historical and demographic overview has shown that immigration to Germany has diversified regarding immigrants' countries of origin and socio-demographic profiles (BIB, 2021). The initial focus on the labor migration of predominantly male, low-skilled guest workers has shifted towards the immigration of the guest workers' family members during the second migration phase. Immigration of relatively young and less qualified ethnic Germans from Eastern Europe and the former Soviet Union peaked at the beginning of the third phase. Later in this period, the immigration of EU citizens and highly skilled third-country nationals increased. With the onset of the European refugee crisis, the dominance of Turkish immigrants has shifted towards EU and non-EU migrants from several countries of origin, CEE countries, in particular. From these countries, younger and older, male and female, lower and higher skilled people come to Germany through various channels such as EU citizenship, family reunification, or labor migration.

This study focuses on the fertility of migrant (not refugee) women who moved to Germany from the 1990s onwards and thus during the third and fourth immigration phases. According to the presented overview, they include (1) relatively high-skilled EU migrants from more "Western" European countries such as Spain, Italy and Greece, (2) ethnic Germans, family members and EU migrants from CEE countries such as Poland, Romania, and Russia, and (3) family members, students or skilled labor migrants from non-European countries such as Turkey, India and China. In contrast to previous research that mainly studied the fertility behavior of guest workers, their family members or ethnic Germans, the transition to motherhood among these more recent immigrant groups is influenced by their more diverse demographic profiles and socialization contexts.

[1] However, Destatis data do not distinguish between voluntary and forced migration but only refer to the foreign-born population. Therefore, the number of first-generation Syrian and Afghan immigrants, in particular, is likely to include a significant proportion of refugees.

2.3 Differences in the transition to motherhood across regions of origin

The empirical findings from life-course research discussed in section 2.1 revealed that migrant fertility differs by immigrants' places of origin. According to the socialization hypothesis, these differences are because they were socialized in different fertility contexts associated with normative expectations about the number and timing of childbearing (Kulu et al., 2019). In contrast to the adaptation hypothesis, migrants retain these internalized fertility norms in the receiving country since their socialization took place at an early and critical life stage. Against this backdrop, the following two paragraphs discuss how migrants from different regions of origin might differ in their fertility-related socialization context and to what extent they can be expected to reflect this context as immigrants in Germany.

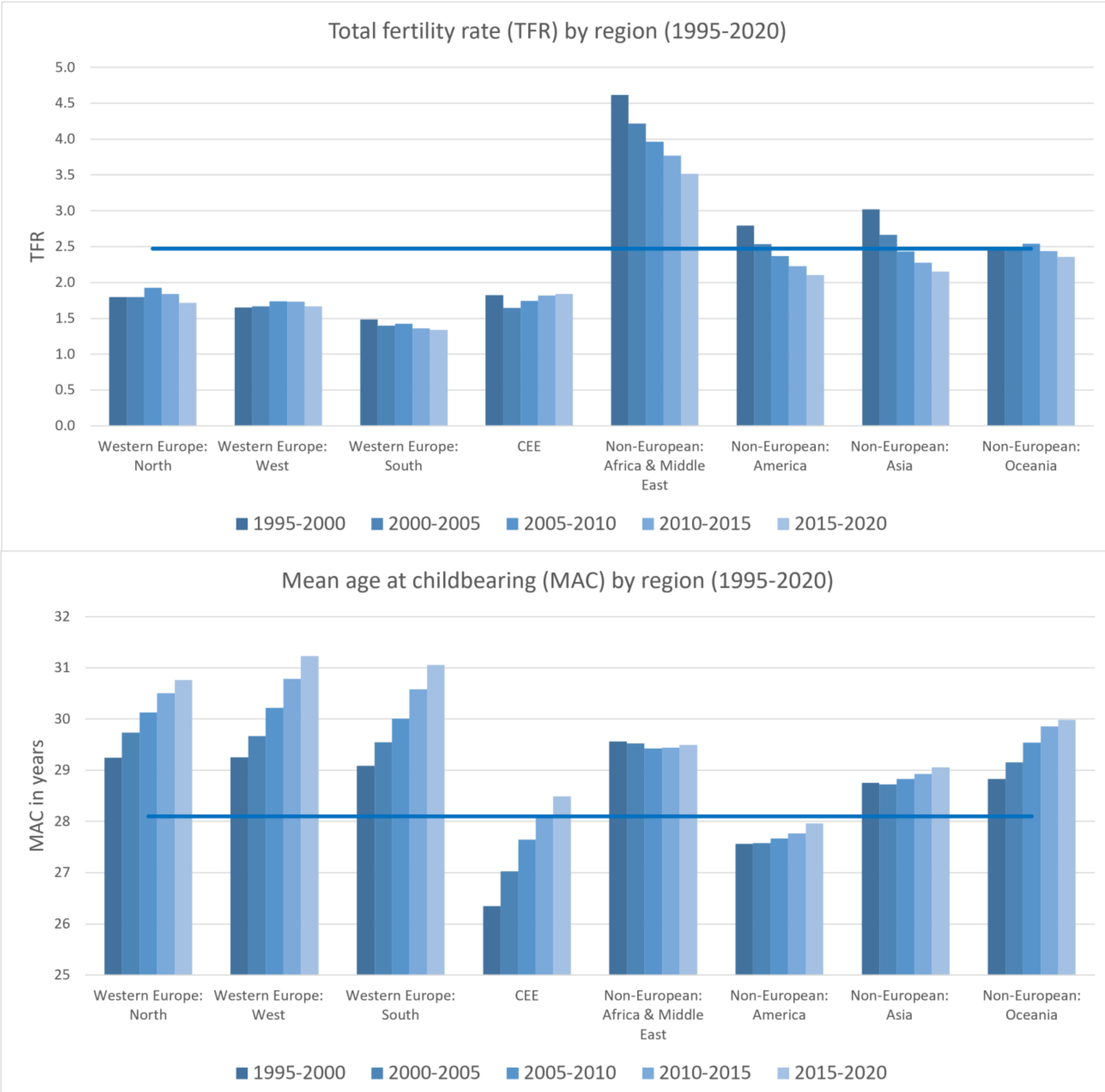
The fertility contexts in different regions of origin

Regarding the transition to motherhood, immigrant groups can be divided into at least three (if not more) regions of origin: (1) Western European, (2) CEE and (3) non-European countries. Although none of the three regions is homogeneous, Western European immigrants can be expected to have experienced a fertility context where women have, on average, fewer and later children than CEE or non-European migrants. This assumption can be derived from Figure 3, which compares TFRs and mean ages at childbearing (MAC) across Western Europe (including its Northern, Western and Southern parts), CEE, and non-European countries (including Africa and the Middle East, America, Asia and Oceania) over the past decades. First, it suggests that people growing up in Western Europe might be socialized in a context where birth rates are lower (e.g., TFR=1.58 in 2015-2020) and the mean age at childbearing (MAC) is higher (e.g., MAC=31.05 in 2015-2020) compared to global averages (TFR=2.47, MAC=28.10 in 2015-2020) (UNPD, 2019). While TFRs have remained relatively low in this region, the MAC has risen steadily since the mid-1990s. This pattern is consistent with the second demographic transition (SDT) model. The model posits that due to cultural, structural and technological changes[2], birth rates have declined in Western societies since the mid-1970s, falling below the replacement level of 2.1 children per woman, with childbearing increasingly postponed to older ages (Billari & Kohler, 2004; Zaidi & Morgan, 2017). Nevertheless, there are some differences within the Western European region. For example, birth rates are higher in the Northern and Western parts (e.g., TFR=1.69 in 2015-2020) than in the South (TFR=1.34 in 2015-2020). Apart from this, the overall pattern of Western Europe is that birth rates do not exceed the average number of children required to replace the existing population. Regarding the mean age at motherhood (MAM), most recent EU data indicate that in 2018, women from Western EU countries had, on average, their first child at age 30 (MAM=29.83, Eurostat, 2021).[3] In summary, migrants born in Western Europe may have been socialized in a rather "low and late" fertility context compared to the rest of the world.

[2] First, cultural changes refer to the shift from altruistic norms to individualism and self-actualization, prioritizing individual well-being and freedom over having children (Zaidi & Morgan, 2017). Second, structural changes such as the increase in women's education and labor force participation increased their opportunity costs of having children. Third, technological changes such as the introduction of the pill increased the availability and acceptance of contraceptive methods.

[3] Although this study focuses on the transition to first birth, I report both the MAC and MAM since the latter was not available for all relevant countries or regions.

Figure 3: Fertility context by region of origin



Source: UNPD (2019), own illustration. Note: The two horizontal lines refer to global averages in 2015-2020. CEE countries are excluded from the Southern part of Western Europe, and the Middle East from Asia. Since the focus is on migrants' context of origin, the Western part of Western Europe does not include Germany.

Second, the fertility context in CEE could be described as a "medium-low and early" one in which it is common to have only one child but that one at a relatively young age (Marczak et al., 2018). Accordingly, the average number of children per woman in CEE (e.g., TFR=1.84 in 2015-2020) slightly exceeds TFRs in the Western or Northern parts of Western Europe (TFR=1.69 in 2015-2020) (UNPD, 2019). Although the average desired family size tends to be around two children in CEE, people from this region often think that they cannot afford to have a second child due to poor and unstable labor market conditions, the lack of childcare, and housing shortages (Mishtal, 2009; Sobotka & Beaujouan, 2014). Regarding fertility timing, the MAC of 28.49 years was among the lowest in the world between 2015 and 2020, although Figure 3 also shows fertility postponement for CEE countries. Similarly, women in CEE-EU countries have, on average, their first child three years earlier (MAM=26.91 in 2018) than those in Western EU countries (Eurostat, 2021).

Third, concerning the non-European region, birth rates are exceptionally high in Africa and the Middle East (e.g., TFR=3.51 in 2015-2020) (Figure 3, UNPD, 2019). This is because the fertility transition has not yet been completed in these sub-regions, and birth rates have only been falling during the last few decades (Bongaarts, 2017). Such high birth rates account for the MAC being higher in this area than in CEE between 1995 and 2020, given that women from Africa and the Middle East have, on average, more children and, therefore, some of them at higher ages (UNPD, 2019). Also, high birth rates contribute to the MAM deviating largely from the MAC in this sub-region. For example, the world's lowest MAMs are found in African countries such as Angola, Niger and Chad, where women have their first child at the age of 18, on average (Worldatlas, 2022). Despite the medium-high MAC, it can thus be concluded that the fertility context in Africa and the Middle East is a "high and early" one regarding the transition to motherhood. This pattern is distinct from America, Asia and Oceania, where TFRs and MAC are comparable to global averages (Figure 3). However, the MAC tends to be lower in America (e.g., MAC=27.96 in 2015-2020) than in Asia (MAC=29.05 in 2015-2020) or Oceania (MAC=29.98 in 2015-2020) (UNPD, 2019). Similarly, MAM data suggest that women have, on average, their first child two years earlier in American countries like Canada and the USA (e.g., MAM=28.5 in 2018) than in Asian countries like Japan and Taiwan (MAM=30.3 in 2018) (HFD, 2022). These differences within the non-European region highlight that this region is not a homogenous fertility context. Especially in Africa and the Middle East, women tend to have more children and enter motherhood at a younger age, on average, than women in America, Asia and Oceania. Nevertheless, it can be concluded that the non-European fertility context is "higher and earlier" compared to the Western European context.

Migrant fertility in Germany

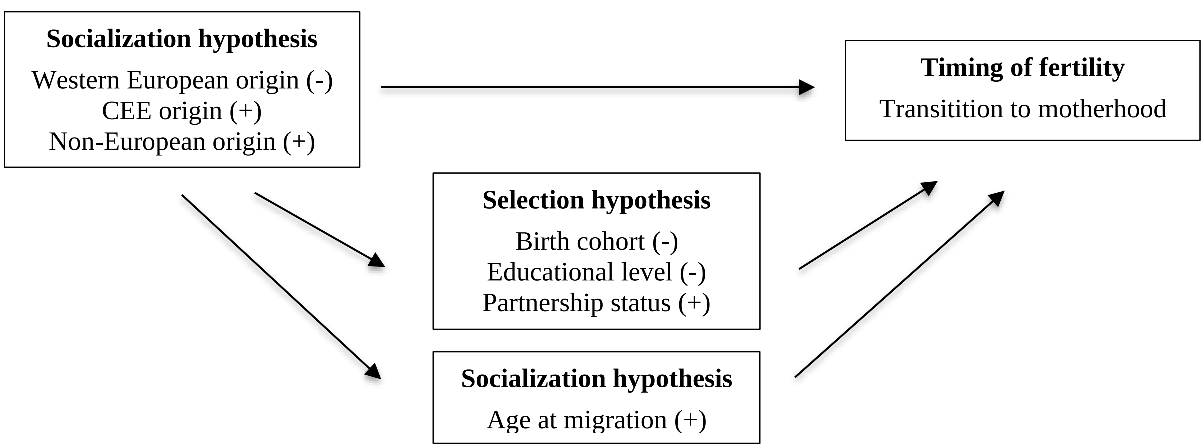
When people emigrate from these different fertility contexts, the empirical findings from section 2.1 suggest that migrants' fertility behavior largely reflects these contexts in Germany. As noted previously, the risk of becoming a mother was, on average, 23% higher among CEE migrants, 149% higher among first-generation immigrant women from Africa and the Middle East, and 34% higher among women born in America, Asia or Oceania compared to Western European migrants (Wolf & Kreyenfeld, 2020). In terms of higher-order birth risks, CEE migrants also reflected the norm of having only one child, as their second-birth risks were, on average, 41% lower than those of Western European migrants. Although women from Africa and the Middle East did not exhibit higher second-birth risks than Western European women (probably due to the Western norm of having two children), they had, on average, 60% higher third-birth risks. Based on these findings, Western European migrant women who have been socialized in a "low and late" fertility context might be less likely to transition to motherhood than CEE or non-European immigrants in Germany. If this expectation can be supported empirically, this would underscore the importance of the socialization hypothesis (see the conceptual model in Figure 4). In summary, the following hypothesis can be stated:

<u>Migrant group differences</u>: Immigrant women from CEE and non-European countries might have higher first-birth risks than women from Western European countries (H1).

2.3.1 Socio-demographic characteristics

In addition to different socialization contexts, another explanation for the expected group differences could be group selection into certain socio-demographic characteristics such as birth cohort, education or partnership status (Figure 4). In other words, immigrants from different regions of origin could differ in these characteristics that influence the transition to motherhood, regardless of socialization in the region of origin. First, given the changing migration patterns to Germany, it might be that migrants from Western European, CEE and non-European countries differ in their birth cohorts. For example, the historically dominant share of Turkish migrants could account for the fact that non-European migrants belong less often to newer birth cohorts than more recent EU migrants from Western Europe. Newer birth cohorts, in turn, might be less likely to transition to motherhood than older cohorts. To be more precise, immigrants born after the onset of the SDT could be less likely to become a mother in Germany compared with migrants born before the SDT. This might be because the changing fertility norms toward fewer and later childbearing since the mid-1970s might have also reduced the first-birth risks of immigrants in Germany (Bianchi, 2014; Erman, 2021). However, it could also be that a larger share of CEE migrants was born after the onset of the SDT than Western European migrants, as immigration from CEE may have increased more than immigration from Western Europe since the 1990s. This would suggest that CEE immigrants may have lower rather than higher first-birth risks than Western European migrants if the post-SDT birth cohort is less likely to transition to motherhood than the pre-SDT cohort.

Figure 4: Conceptual model of the transition to motherhood across immigrants from different regions of origin



Note: Own illustration.

Second, a better mediator in the relationship between the region of origin and transition to motherhood might be *education*. Previous research found that the majority (69%) of first-generation immigrants from Africa and the Middle East living in Germany did not have a university or vocational training degree (Wolf & Kreyenfeld, 2020). In contrast, half (50%) of the Western European migrants stated to have a university degree, while migrants from CEE as well as from America, Asia and Oceania were either low- or high-educated. Higher educational levels might, in turn, be associated with lower fertility as it increases the opportunity costs of becoming a mother (Bianchi, 2014). This suggests that Western European immigrants might have lower first-birth risks because they have, on average, higher educational levels compared with migrants from CEE or non-European countries. Third, partnership status may be another factor explaining the potentially higher first-birth risks of migrants from CEE and non-European countries compared to Western European immigrants. Data from 2018 revealed that the percentage of women aged 15-49 years who are married or in a union was substantially higher in Asia (70.7%) and Africa (61.9%) and slightly higher in Eastern Europe (56.7%) than in Western Europe (54.6%) (UNPD, 2020). Assuming that the migration process affects the partnership status of migrants from different regions of origin to a similar extent (which may be less true for migration from non-European countries, for example), these findings suggest that immigrants from non-European and CEE countries could be more likely to have a partner than Western European immigrants. Having a partner, in turn, might have a positive effect on the transition to motherhood compared to singlehood. Although German research has focused on the interrelation between marriage and migrant fertility, it can be expected that in nonmarital partnerships, too, partnered migrants might be more likely to become a mother than single migrants (e.g., Cygan-Rehm, 2014; Erman, 2021; Milewski, 2007, 2010a; Wolf, 2016). Especially since the onset of the SDT, children are increasingly being born in nonmarital unions (Zaidi & Morgan, 2017). To conclude, there is support for the selection hypothesis when differences between the three regions in their birth cohorts, educational levels, and partnership status partly account for their differences in fertility. Hence, H2 addresses the explaining (or mediating) role of socio-demographic characteristics in the region of origin effects on migrants' first-birth risks. H2a-c summarize the expectations regarding the relationship between each socio-demographic characteristic and the fertility outcome.

Selection effects: Group selection into socio-demographic characteristics (such as being born since the onset of the SDT, higher education and having a partner) might partly explain the higher first-birth risks of immigrant women from CEE and non-European countries compared to those from Western Europe (H2).

Birth cohort: Immigrant women born since the onset of the SDT might have lower first-birth risks than those born before the onset of the SDT (H2a).

Educational level: Immigrant women with higher educational levels might have lower first-birth risks than lower-educated ones (H2b).

Partnership status: Immigrant women who have a partner might have higher first-birth risks than those who are single (H2c).

2.3.2 Age at migration

If fertility differences across regions of origin were indeed related to socialization (and not only selection), then the socialization hypothesis would suggest that age at migration could be another factor explaining these group differences (Figure 4). On the one hand, national data show that immigrants from different places of birth differ in their mean age at arrival in Germany (Destatis, 2022a). In 2020, foreign-born women from Western European countries were, on average, 21.3 years when they migrated to Germany, whereas CEE (24.8 years) and non-European immigrants (23.3 years) were slightly older. On the other hand, section 2.1 illustrated that, according to the socialization hypothesis, people who migrated at older ages might be more likely to have a child in the destination country than immigrants who arrived at younger ages. However, the empirical findings discussed in the same section revealed that this hypothesis could not always be supported empirically. In the case of Germany, they suggested that foreign-born Turks were more likely to transition to motherhood if they migrated during adolescence or young adulthood (15-19 years) or the early 20s (20-24 years) than if they arrived at higher ages (Wolf, 2014, 2016). As these findings were based on Turkish migrants only, this study tests the socialization hypothesis for migrants from more diverse regions of origin, still expecting positive age at migration effects on the transition to the first birth. However, if a negative relationship is found, this would again illustrate that the original socialization hypothesis does not hold empirically. It should also be noted that the expected positive relationship could be less true for Western European migrants since their "low and late" socialization context might be more similar to the fertility norms in Germany compared to the socialization context of CEE or non-European migrants. In summary, H3a expects that age at migration partly explains (or mediates) the potential differences between the regions of origin in their transition to motherhood. This could be because, on average, CEE and non-European immigrants might have been older at the time of migration, while migrants who arrived at a higher age are expected to be more likely to transition to motherhood than those who migrated in adolescence or young adulthood (H3b). Given that the selection and socialization hypotheses could be complementary rather than contradictory, H4 tests whether age at migration still partly explains the fertility differences by region of origin if socio-demographic characteristics are considered.

Socialization effects: Higher ages at migration might partly explain the higher first-birth risks of immigrant women from CEE and non-European countries compared to those from Western Europe (H3a).

Age at migration: Compared to immigrant women who moved to Germany between the ages of 15 and 19, those who migrated later in life might have higher first-birth risks (H3b).

Socialization and selection effects: Higher ages at migration might partly explain the higher first-birth risks of immigrant women from CEE and non-European countries compared to those from Western Europe, given selection into socio-demographic characteristics (H4).

3. Data, measures and methods

3.1 The SOEP "Migration Samples"

I used data from the German Socio-Economic Panel (SOEP) to test the above hypotheses. The SOEP is a nationally representative study of adult household members living in Germany (Goebel et al., 2019). As the same households are surveyed annually, the longitudinal data are structured so that person-years are nested within persons, with persons clustered within households. The SOEP data capture a wide range of demographic, social, economic, and cultural indicators, including prospective and retrospective information on respondents' fertility, migration and partnership histories. The current research is based on Wave 36 (v36; the most recent wave as of March 2022), covering data from 1984 to 2019 (Liebig et al., 2021). Considering the different subsamples of the SOEP, I used the "Migration Samples" M1 and M2 available since 2013 and 2015. M1 targeted individuals who migrated to Germany from 1995 onwards, as well as second-generation immigrants (Brücker et al., 2014). M2 focused on individuals who immigrated between 2009 and 2013. To account for contemporary immigration patterns in Germany, M1 and M2 oversampled households with individuals from CEE countries like Poland or Romania, Western European countries like Italy or Spain, and non-European countries like Turkey or other Muslim countries (Eisnecker et al., 2017). Note that they were sampled based on the birthplace of the household head and that the SOEP also surveys other adults living in the same household as the household head. This has two implications. First, the "Migration Samples" are representative of households headed by a foreign-born person rather than all private households in which foreign-born people live in Germany. Second, the data cover not only the initial target populations but also other immigrants who, for example, immigrated before 1995 and later joined the SOEP household. Moreover, based on a multistage stratified sampling design, these target populations were randomly sampled using administrative data from the Federal Employment Agency (*Integrated Employment Biographies*; IEB) (Siegers et al., 2020). The IEB sampling frame affects the representativeness of the "Migration Samples", as it does not cover civil servants and self-employed individuals, and not all SOEP respondents consented to link their survey information with administrative data (Kühne & Kroh, 2017). Apart from this, I consider the quality of the "Migration Samples" appropriate (see Table A2 in the appendix for a more detailed reflection on data quality, including ethical considerations of the micro-data).

There are three arguments for using the SOEP "Migration Samples" to study the transition to motherhood across first-generation immigrants from different regions of origin living in Germany. First, the sampling strategy covered foreign-born immigrants of Western European, CEE and non-European origin who have migrated to Germany since the 1990s. Second, few researchers have used these relatively new samples to study the fertility behavior of first-generation immigrants living in Germany (e.g., Erman, 2021; Wolf & Kreyenfeld, 2020). As previous studies focused on the childbearing behavior of former guest workers, their family members or ethnic Germans, they have often used Sample B or D, which oversampled these migrant groups (e.g., Cygan-Rehm, 2014; Mayer & Riphahn, 2000; Milewski, 2007, 2010a, 2010b). Third, since SOEP data are collected both annually and retrospectively, they allow respondents to be followed over parts of their life course, which is consistent with the life-course approach.

3.2 Measures

Based on the SOEP data, I created the dependent and independent variables summarized in Table 2. For the dependent variable *first childbirth*, I used data from the *biobirth* file, which contains prospective and retrospective information on female and male respondents' birth histories (Schmitt, 2020). More specifically, I used the year of the first birth to create a time-varying binary event indicator. It takes the value of 0 if the event has not taken place yet and is coded 1 in the year of the childbirth. Overall, 66% of respondents (n=749) in the analytical sample had a first birth within the observation period. Furthermore, I included several covariates from different data files. Using the *ppath* file, I created the main independent variable *region of origin* as time-constant and categorical. This measure is based on migrants' country of birth. As the analytical sample includes 87 different countries of origin, each with 1 to 164 respondents, I did not study the countries individually. Instead, I grouped them according to the classification scheme in Table A3 in the appendix. This scheme distinguishes between Western European, CEE and non-European migrants and is based on a classification used by other researchers in the German context (Wolf & Kreyenfeld, 2020). The reference category contains 161 immigrants from Western Europe, mainly Spaniards, Italians and Greeks. In addition, there are 252 persons from non-European countries, of which 31% (n=78) are from Turkey (see the top five countries of origin per region in Table A4). Given the increase in immigration from CEE since the 1990s, the largest region of origin includes 730 women from CEE countries (Table 2). Of them, 44% (n=321) were born in Poland or Romania (Table A4).

Moreover, I created the independent variables birth cohort, educational level, and partnership status as indicators of socio-demographic characteristics (Table 2). First, I used respondents' birth year from the *ppath* file to generate the time-constant, binary *birth cohort* variable. Since fertility decline and postponement began in the mid-1970s in Western societies, I chose 1975 to distinguish between migrants born before or after the onset of the SDT (Bianchi, 2014).[4] Note that the variable is unevenly distributed, as 83% of respondents (n=945) belong to the newer cohort, while the reference category only includes 17% of respondents (n=198) born before 1975. The second variable is a time-constant, binary indicator of *educational level*s taken from the *pgen* data file. It measures the highest educational degree a respondent has ever reported across the panel. The reference category "lower education" includes 60% of respondents (n=682) with a secondary vocational degree plus vocational training or lower. The other 40% of respondents (n=461) belong to the "higher education" category, which indicates lower or higher tertiary education. Third, I created the time-varying categorical *partnership status* variable. It indicates whether or not a respondent had a partner at a given age or year. As I follow respondents from age 15 rather than the time of their first interview, any time-varying covariate requires retrospective data. Therefore, I used retrospective data from the *biocouply* data file (see a discussion on their quality in Table A2 in the appendix). Unlike retrospective fertility data, these data are only collected for individuals who have filed the biography questionnaire in wave 28 or later (Hamjediers et al., 2022). This results in almost 20% of observations for the retrospective partner variable being missing. Adding prospective information measured by the question "Are you in a serious/permanent relationship?" from the *pl* file could only reduce this proportion by 0.4%. Based on these prospective and retrospective data, I coded the partnership status variable so that the reference category includes 41% of observations when respondents were single or separated or answered "no" to the

[4] However, since people do not adopt social norms immediately, the effect of the SDT might be delayed. Therefore, I created additional cohort measures distinguishing between migrants born before or after 1980, 1985, or 1990, testing them in sensitivity analyses (more on this in section 4.3).

prospective survey question. The category "having a partner" contains 39% of observations when individuals were married, coupled, or in a registered same-sex partnership or answered "yes" to the prospective survey question. In order to not lose too many observations, I did not drop individuals with missing partner data. Instead, I kept these missing values using an extra category.

Table 2: Overview of the dependent and independent variables

Measure	**Person-years**	**Persons**	**Variable type, description, coding**
First childbirth			Time-varying, categorical (dummy) Recoded from "Please provide the following information for each of your children. Please start with the oldest one: Child 1" [year of birth] (kidgeb01 in biobirth)
Not yet	16,578	1,143	0
Event	749	749	1
Region of origin			Time-constant, categorical Recoded from "What country is your birthplace located in today?" (corigin in ppath) using the classification scheme in Table A3
Western Europe	2,772	161	0
CEE	10,995	730	1
Non-European	3,560	252	2
Birth cohort			Time-constant, categorical (dummy) Recoded from "What are your birth month and birth year?" [Year] (gebjahr in ppath)
<1975	3,777	198	0: 1957-1974
1975+	13,550	945	1: 1975-1998
Educational level			Time-constant, categorical (dummy) Recoded from respondents' highest educational degree based on the CASMIN[1] classification (pgcasmin in pgen)
Lower education	9,248	682	0: Secondary vocational degree plus vocational training or lower (CASMIN 1a-2c)
Higher education	8,079	461	1: Lower or higher tertiary education (CASMIN 3a-3b)
Partnership status			Time-varying, categorical Recoded from the observed or retrospectively collected partnership status (spelltyp in biocouply) [Added by prospective partnership data measured by "Are you in a serious/permanent relationship?" (pld0132_h in pl)]
Single	7,118	904	0: Single, separated [no]
Having a partner	6,829	923	1: Married, registered same-sex partnership, coupled [yes]
Missing values	3,380	226	2: Implausible, unknown, unit non-response
Age at migration			Time-constant, categorical Recoded from "When did you move to Germany?" (immiyear in ppath) (Last) year of migration (immiyear) – birth year (gebjahr)
15-19 years	1,935	196	0
20-24 years	5,215	413	1
25-29 years	5,697	332	2
30+ years	4,480	202	3
Total	17,327	1,143	

Source: SOEP v36 (1984-2019), own calculations. Note: [1]Comparative Analysis of Social Mobility in Industrial Nations (CASMIN).

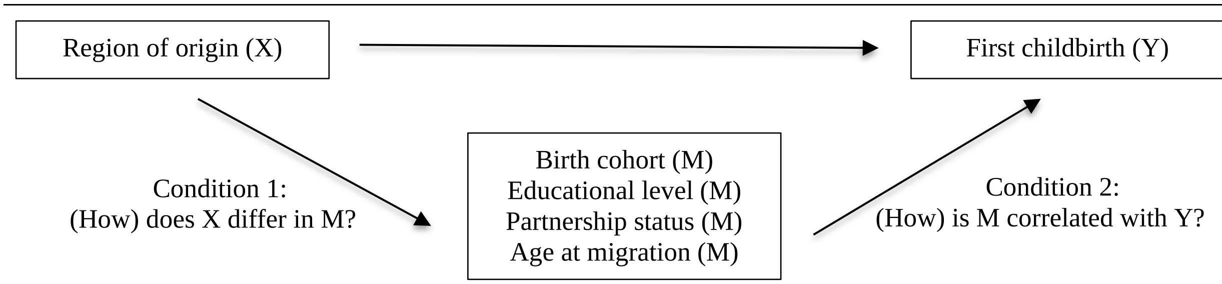
Lastly, I used the retrospectively collected year of the last migration to Germany from the *ppath* file to generate the time-constant categorical variable *age at migration*. It distinguishes between the reference category "15-19 years" and the age groups "20-24 years", "25-29 years" and "30+ years". This categorization considers the varying migration effects at different life stages, such as migration in adolescence or young adulthood (15-19 years) compared to ages in later adulthood. With 36%, most respondents migrated between 20 and 24 years (n=413). Lastly, I created the time-varying and continuous control variables *linear age* and *quadratic age* using the respondents' age. I consider quadratic age to test whether the transition to motherhood depends on a non-linear age function. Women's (linear) age ranges from 15 to 40 years, with the average woman being 23 years old.

3.3 Analytical approach

Descriptive Analyses

Using the above variables, I conduct different descriptive and multivariate analyses. The descriptive analyses are twofold. First, I look at the transition to motherhood by region of origin. Therefore, I examine how the mean distribution of first-birth events differs between migrants from different regions. I also compare the mean age at first childbirth by region of origin for respondents who became mothers across the observation period. Since there are more than two regions, I use the F-test from the one-way ANOVA to test if at least one region is statistically significantly different from the others. As a post-hoc test, I specify the Bonferroni option to determine what regions are significantly different. Second, I examine whether birth cohort, educational level, partnership status, and age at migration could be potential mediators in the relationship between the region of origin and first childbirth. In doing so, I explore the following two conditions: if (and how) migrants from different regions of origin differ in the four potential mediators (condition 1), and if (and how) the potential mediators are associated with the fertility outcome (condition 2) (Figure 5). Regarding condition 1, I again use the one-way ANOVA and Bonferroni tests to determine the statistical significance of the mean differences in the potential mediators across the three regions. To examine condition 2, I estimate the correlation between each potential mediator and the event indicator first childbirth. If conditions 1 and 2 are met, the corresponding independent variable can be considered a potential mediator in the relationship between the region of origin and first childbirth.[5]

Figure 5: Approach to examining potential mediators (M) in the region of origin (X) effects on first childbirth (Y)



Note: Own illustration.

[5] As both partnership status and age at migration are neither binary nor continuous variables, I temporarily exclude the missing values category of partnership status and use a continuous age at migration variable when running ANOVA tests (condition 1) and correlations (condition 2).

Multivariate Analyses

In addition to the descriptive analyses, I conduct multivariate analyses to introduce the potential mediators in the relationship between the main independent variable region of origin and the dependent variable first childbirth, given the age controls. Since the interest is in the event of having a first birth, I perform event-history analyses (EHA) to examine how and why the regions of origin could differ in their transition to motherhood. In EHA, time can be modeled as either continuous or discrete (Allison, 1984). In the continuous case, the dependent variable is a duration variable that counts the time (such as age years) until the event occurs (such as first birth). Assuming that the effects of the covariates are constant over time, one could estimate a Cox proportional hazard model to examine if, for example, CEE and non-European migrants have, on average, a shorter duration until they transition to motherhood than Western European migrants (Cox, 1972). One feature of this semi-parametric and multiplicative Cox model is that it does not impose the shape of the relationship between time and the event. This contrasts with models where time is treated as discrete. In the discrete case, logistic regression can be used to estimate the variation in the binary event indicator (dependent variable) as a function of time and other (time-varying or time-constant) covariates (Allison, 1982). In other words, time is not included in the dependent variable but on the other side of the regression equation. Based on the SOEP data, I decided to model time as discrete since the data are organized in person-years, and a woman can give birth to more than one child within a year. Hence, the length of the time interval is larger than the number of events that can occur within the interval. For one, it could be argued that because the time intervals (age years) are not very large, a continuous-time model is likely to estimate similar results to the discrete-time model (Allison, 1984). For another, I could have ensured a more continuous measurement of time if I had considered not only the year but also the month of the childbirth. However, in weighing the relative costs and benefits, I decided to keep the data in the person-years format, given the time-varying independent variable partnership status. Also, since time is modeled as an independent variable, discrete models are more flexible in treating time in a non-linear or non-continuous way (Blossfeld et al., 2014). Based on this decision, I created the binary event indicator first childbirth, whose two outcomes are mutually exclusive. They indicate whether or not a woman has a first birth, given that the event has not occurred before. Due to this binarity, I estimate several models using logistic regression, generally defined as follows:

$$\log\left(\frac{p_{ti}}{1-p_{ti}}\right) = \alpha * D_{ti} + \beta * x_{ti} ,$$

where p_{ti} denotes the probability that woman *i* experiences the event of having a first birth during the time interval *t* measured in age years, which is a vector function of the coefficients α with the cumulative duration by the time interval D_{ti} and the vector of covariates x_{ti} with the coefficients β.

Based on this regression equation, I estimate a baseline model (M0) regressing the dependent variable first childbirth on the control variables linear age and quadratic age. Using the Wald test, this model tests whether the inclusion of the quadratic age function provides a statistically significant increase in the performance of the model. If this is the case, I will continue using both linear and quadratic age in the following models that introduce the independent variables stepwise (Table 3).

Table 3: Model specifications for testing the hypotheses

	Model 1	**Model 2**	**Model 3**	**Model 4**
Dependent variable	First childbirth	First childbirth	First childbirth	First childbirth
Control variable	Linear age Quadratic age	Linear age Quadratic age	Linear age Quadratic age	Linear age Quadratic age
Main explanatory variable	Region of origin	Region of origin	Region of origin	Region of origin
Potential mediator		Birth cohort Educational level Partnership status	Age at migration	Birth cohort Educational level Partnership status Age at migration
Hypothesis to be tested	H1	H2, H2a-c	H3a, H3b	H4

Note: Own illustration.

In the first model (M1), I add the *regions of origin* to the age effects on first childbirth, with Western Europe as the reference category. This model tests H1, which expects that CEE and non-European immigrants are more likely to transition to motherhood than Western European migrants. H1 is supported if the coefficients for CEE and non-European migrants are positive and statistically significant at the 5% significance level compared to Western European migrants in M1. To examine how the regions differ in their time to motherhood, I also test interaction effects between the region of origin and quadratic age. The second model (M2) adds *birth cohort*, *educational level*, and *partnership status* to M1. This model tests the selection hypothesis H2, which expects that selection into these socio-demographic characteristics partly explains (or mediates) the region of origin effects on the transition to motherhood. There is support for H2 if for both the CEE and the non-European effect, the mediation percentages of the 1975+ birth cohort, higher education and having a partner are each positive and if their indirect effects are statistically significant compared to the pre-1975 birth cohort, lower education or singlehood. The mediation percentage indicates how much the inclusion of each potential mediator reduces the CEE or non-European coefficient in M2 (direct effect) compared to M1 (total effect). The indirect effect is the estimated difference between the total and direct effect. More formally, the mediation percentage and indirect effect can be described as follows:

$$Mediation\ percentage = \left(\frac{total\ effect - direct\ effect}{total\ effect}\right) * 100 = \left(\frac{indirect\ effect}{total\ effect}\right) * 100$$

In addition to this mediation analysis, the expectation of lower first-birth risks for migrants born in 1975 or later (H2a) is supported if their coefficients are negative and statistically significant compared to the pre-1975 birth cohort in M2. Similarly, the hypothesis of a negative relationship between educational level and first childbirth (H2b) cannot be rejected if the same model yields negative and statistically significant coefficients for higher educated migrants compared to lower educated ones. H2c is supported if, in M2, the coefficients for migrants who have a partner are positive and statistically significant compared to those who are single. The third model (M3) adds *age at migration* to M1. Similar to the previous mediation analysis, there is support for the expectation that higher ages at migration partly explain the CEE and non-European effects (H3a) if, for both regional effects, the mediation percentages and indirect effects of the 20-24, 25-29 and 30+ age at migration categories are positive and statistically significant compared to migrants who arrived between 15 and 19 years. The expected positive relationship between age at migration and first childbirth (H3b) finds support if the coefficients of the 20-24, 25-29 and 30+ categories are positive and statistically significant compared to the 15-19 age category. Lastly, the fourth model (M4) adds socio-demographic characteristics to M3 to test if higher *ages at migration* partly explain the fertility differences between the regions of origin, given *socio-demographic characteristics* (H4). If the mediation percentages and indirect effects of the 20-24, 25-29 and 30+ age at migration categories remain positive and statistically significant when socio-demographic characteristics are included, M4 supports H4.

Comparing regression coefficients across groups and models

The above models represent the logit models underlying the EHA. However, the coefficients estimated by these non-linear probabilistic models (NLPM) can neither be compared (1) between groups within the same model nor (2) between nested models (Breen et al., 2013, 2018; Mood, 2010). This is because the NLPM does not estimate regression coefficients separately from the error variance. Instead, the logit coefficients are the ratio of the true regression coefficients divided by a scale factor that depends on unobserved heterogeneity. For this study, the first implication would be that the age effects, for example, should not be compared across groups such as regions of origin. They will depend on different scales that vary as a function of unobserved heterogeneity. In other words, NLPMs refer to relative rather than absolute effects, ignoring different baseline probabilities. More importantly, the second implication is that NLPMs are not appropriate for examining whether the inclusion of the potential mediators in M2-M4 reduces the CEE or non-European coefficients compared to M1. One reason is that any additional covariate, such as the age at migration in M3, will necessarily reduce the unexplained variance and thus the scale factor, which would increase the CEE and non-European coefficients. These increased coefficients would then lead to an underestimation of the mediation percentage. In addition to this scaling problem, another reason is that the distribution of the error term in M1 is not only logistic but also includes the distribution of the mediators (unobserved in M1). Therefore, if, for example, age at migration were included in M3, the fit of the error would differ between M1 and M3. As a result, any differences in the logit coefficients of the region of origin variable across the nested models would also reflect changes in the fit of the error.

There are several solutions to the two implications (Breen et al., 2013, 2018; Mood, 2010). Concerning the first implication, I estimate average marginal effects (AME), which are based on the probability scale and thus hold the rescaling constant. They are also easier to interpret than log-odds or odds, indicating, for example, the mean difference in the predicted probability of having a first birth between CEE and Western European migrants, given the observed values of the other covariates. Unlike marginal effects at the means (MEM), the estimation of AMEs does not create hypothetical average migrants but uses the actual observed values of the other covariates (Williams, 2012). Since all explanatory variables are categorical in this study, I use AMEs based on the values of the covariates as observed to provide a more realistic interpretation compared to MEMs (for example, a value of 0.6 on partnership status would make little sense). Moreover, I estimate predicted probabilities to examine how the regions of origin differ in their time to motherhood. For the second implication concerning the mediation analysis, I apply the Karlson/Holm/Breen (KHB) method (Karlson et al., 2012; Kohler et al., 2011). This method holds constant the rescaling and the change in the fit of the error. Hence, in contrast to other solutions such as the Y-standardization, linear probability models or average partial effects that only account for rescaling, the KHB method is unaffected by the changing distributions of the error terms. To examine if and how much of the CEE or non-European coefficients are reduced by introducing the potential mediators in M2-M4, I estimate the overall and disentangled indirect effects. The overall effect is the indirect effect of all potential mediators included in the model (e.g., socio-demographic characteristics in M2). Disentangled effects refer to the individual indirect effects of each variable category (e.g., higher education in M2). Based on these overall and disentangled effects, the mediation percentages and their p-values (in the case of overall effects) or standard errors (in the case of disentangled effects) can be determined to evaluate the mediation hypotheses H2, H3a or H4. In summary, I will interpret these mediation hypotheses using the KHB method (see section 4.3), whereas the logit models estimated by AMEs test H1, H2a-c and H3b (see section 4.2). Given the longitudinal data format, I adjust standard errors for person-years clustered within persons in all regression analyses. [6] The analyses are conducted in STATA using version 17.

3.4 Study population

Sample selection

Based on this methodological approach, I selected the analytical sample as shown in Table 4. Since the present work examines the transition to motherhood of foreign-born immigrant women living in private households in Germany, I excluded 4,885 respondents from the "Migration Samples" who were not foreign-born, female or "voluntary" migrants (such as refugees). Based on the definition of a first-generation immigrant given in Chapter 2, I excluded another 443 respondents by selecting immigrants who were at least 15 years old at the time of the migration. Furthermore, I selected immigrants who moved to Germany in 1990 or later, which excluded 63 respondents. Although the "Migration Samples" focus on immigrants who arrived since 1995, they contained few foreign-born persons prior to this year due to the SOEP sampling strategy. Considering the third and fourth immigration periods discussed in section 2.2, I decided to include these additional respondents from 1990 onwards. As the present study aims to explain why a woman becomes a mother as an immigrant in Germany, I excluded 1,021 women who had their first birth in the years before arriving in Germany. I also dropped 16 persons with missing information on their highest educational level (nine of them were still in education) and another seven persons with missing values on the birth year of the first child.

Study observation and censoring

Since this study conducts discrete-time EHA to estimate the predicted probability of becoming a mother, I follow respondents over the period in which they are at risk of having a first birth. Considering a woman's fertile years, I assume that women become at risk from age 15 onwards. However, since the SOEP data track respondents only from the age at their first interview, I reconstructed the women's first birth histories from age 15 using retrospective information on the year of a woman's first childbirth from the *biobirth* file. Based on the biography questionnaire and information derived from the household composition, this file provides fertility data for all women who have ever participated in at least one SOEP interview. The above exclusion of seven respondents with missing data on the year of their first childbirth (accounting for 0.6% of the final sample size) suggests that retrospective fertility data were available for most respondents included in this study. Finally, the reconstructed observation period ends in the year the respondent becomes a mother since she is no longer at risk of having a first birth in the following years. Respondents who did not become mothers by age 40 were right-censored at either this age or the age of their last interview if they

[6] Although individuals are also clustered within households in the original SOEP data, the analytical sample contains almost as many households as individuals, suggesting that most respondents belong to different households.

left the panel earlier. Restricting the sample to age 40 was necessary because both the number of events and the population at risk became small after that age. Due to this censoring criterion, I subsequently restricted the analytical sample to women who arrived in Germany by age 38, as they must still be at risk of first birth when living in Germany. This selection excluded 63 respondents (Table 4). The final sample includes 1,143 women. In sum, the analyses are representative of foreign-born migrant women aged 15 to 40 years living in private households in Germany if they were childless before they immigrated in 1990 or later and between ages 15 and 38.

Table 4: Sample selection, observation period and censoring

Steps	Person-years	Persons
Sample selection		
Initial sample including all sub-samples	712,355	99,131
Selecting the "Migration Samples" M1 and M2	26,203	7,641
Selecting the foreign-born population	20,161	5,821
Selecting women	10,877	3,064
Select "voluntary" migrants	9,774	2,756
Selecting migrants who immigrated at age 15 or older	8,297	2,313
Selecting migrants who immigrated since 1990	8,054	2,250
Selecting migrants who were childless prior to the migration	4,179	1,229
Deleting individuals with missing educational levels	4,139	1,213
Deleting individuals with invalid first birth histories	4,119	1,206
Observation period and censoring		
Expanding the data to follow respondents from age 15 onwards	20,345	1,206
Right-censoring respondents at age 40	18,951	1,206
Sample selection due to censoring		
Selecting migrants who immigrated by age 38	17,327	1,143

Source: SOEP v36 (1984-2019), own calculations.

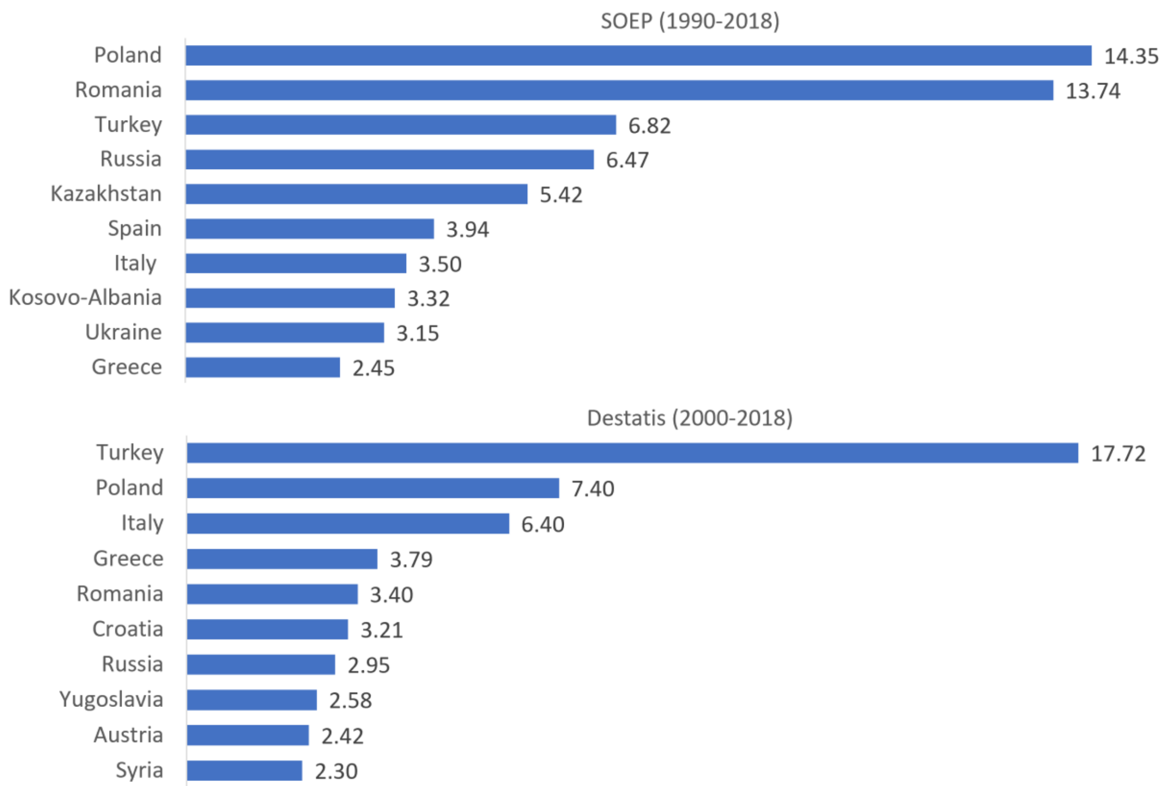
Representativeness of the SOEP sample

Although the analytical SOEP sample just described represents a selective group, Figure 6 suggests that the selected women partly reflect the foreign-born population in Germany in a comparable period. The figure compares the share of first-generation immigrants from the top ten countries of origin in the analytical SOEP sample with the share of the top ten foreign citizenships of foreign-born immigrants in the population between 2000 and 2018 (Destatis, 2022c).[7] It shows that Poland, Romania, Turkey, Russia, Italy and Greece ranked among the top ten countries of origin in the SOEP sample, as well as foreign citizenships in the population. Yet, there are some differences between the sample and the population. First, non-European immigrants from Turkey represented the largest migrant group in the population between 2000 and 2018, whereas their share in the SOEP sample was reduced by 11%. Second, the SOEP sample contained larger shares of migrants from CEE countries like Poland, Romania, Russia, Kazakhstan, Kosovo-Albania, and Ukraine than the population. Third, while the share of Western European migrants is small in both the

[7] In Destatis data, the definition of immigrants include refugees but not ethnic Germans. Therefore, the two datasets are not fully comparable. Specifically, the different definitions are likely to contribute to the higher share of Syrians and lower share of CEE immigrants in Destatis data than the SOEP sample.

sample and the population, the share of migrants from Italy or Austria was about half as low in the SOEP data as in the population. In contrast, the share of Spanish migrants was 2.5 times higher in the sample. Based on this comparison, the women's top ten countries of origin in the analytical sample do not fully represent the top ten foreign citizenships in the foreign-born population in a similar period. Nevertheless, they partly reflect these citizenships.[8]

Figure 6: Comparison of the analytical SOEP sample with the foreign-born population in Germany between 2000 and 2018



Source: SOEP v36 (1984-2019), Destatis (2022c), own illustration. Note: The SOEP data are based on the number of first-generation immigrants by country of origin in the analytical sample. Respondents immigrated between 1990 and 2018. Destatis data refer to the number of foreign-born immigrants by foreign citizenship in Germany between 2000 and 2018. Values are given in percent, indicating the number of immigrants from this country as a share of the total number of first-generation immigrants.

[8] Similar to respondents' countries of origin, Table A5 in the appendix suggests that their type of immigration partly reflected the migration patterns discussed in section 2.2.

4. Analyses and results

4.1 Descriptive analyses

Variation in first childbirth by region of origin

In the descriptive analyses, I first looked at how the regions of origin differed in the transition to motherhood. Table 5 illustrates how many women from each region transitioned to the first birth across the observation period. Accordingly, 65% of CEE and 76% of non-European respondents had a first birth between the ages of 15 and 40. In contrast, almost one in every second Western European woman (48%) remained childless by age 40. The Bonferroni test suggested that CEE and non-European migrants were statistically significantly more likely to have a first birth until the time of censoring than Western European migrants. Among those who became a mother, Table 6 indicates that the regions significantly differed in their mean age at motherhood. On average, mothers from CEE and non-European countries had their first birth at age 27, significantly three years earlier than Western European mothers.

Table 5: Distribution of first childbirth events by region of origin on the person level

	First childbirth by age 40		
	No event	Event	Total
Western Europe	77	84	161
	(47.83%)	(52.17%)	(100%)
CEE	257	473	730
	(35.21%)	(64.79%)	(100%)
Non-European	60	192	252
	(23.81%)	(76.19%)	(100%)
Total	394	749	1,143
	(34.47%)	(65.53%)	(100%)

Source: SOEP v36 (1984-2019), own calculations. Note: Row percentages are in parentheses. The one-way ANOVA test was used to test whether at least two regions differed significantly regarding their mean distribution of mothers (p=0.000). Differences between Western European migrants and CEE or non-European migrants have been tested using the Bonferroni test (CEE vs. Western Europe: p=0.006, non-European vs. Western Europe: p=0.000).

Table 6: Summary statistics of the age at first childbirth by region of origin on the person level

	Mean	Diff.	SD	Median	Min	Max	n
Western Europe	30.38		5.00	31	19	40	84
CEE	27.38	-3.00***	4.93	27	17	40	473
Non-European	26.99	-3.39***	5.37	26	18	40	192
Total	27.62		5.15	27	17	40	749

Source: SOEP v36 (1984-2019), own calculations. Note: This analysis refers to mothers only (n=749). The one-way ANOVA test was used to test whether at least two regions differed significantly regarding their mean age at motherhood (p=0.000). The presented differences in the mean age at first childbirth between Western European mothers and CEE or non-European mothers have been tested using the Bonferroni test (CEE vs. Western Europe: p=0.000, non-European vs. Western Europe: p=0.000). *p<0.05, **p<0.01, ***p<0.001.

Condition 1

Next, I looked at whether or not socio-demographic characteristics and the age at migration could be potential mediators in the region of origin effects on first childbirth. For one, I examined if and how migrants from different regions differ in the potential mediators (condition 1). Results indicated that the regions of origin significantly differed in all potential mediators except for the birth cohort variable. Accordingly, Table 7 shows that the share of migrants born in 1975 or later was only marginally lower among non-Europeans (80%) than Western Europeans (81%). While a larger share of CEE migrants (84%) belonged to the newer birth cohort than Western European migrants, these differences were not statistically significant at the 5% significance level (as were the differences between non-Europeans and Western Europeans).[9]

Table 7: Distributions of potential mediators by region of origin (condition 1)

Potential mediator	Western Europe	CEE	Non-European	All regions
Birth cohort				
<1975	19.25%	16.03%	19.84%	17.32%
1975+	80.75%	83.97%	80.16%	82.68%
Educational level				
Lower education	34.78%	63.70%	63.89%	59.67%
Higher education	65.22%	36.30%	36.11%	40.33%
Partnership status				
Single	41.20%	39.45%	46.04%	41.08%
Having a partner	45.02%	39.70%	34.16%	39.41%
Missing values	13.78%	20.85%	19.80%	19.51%
Age at migration	(26.12)	(24.20)	(24.62)	(24.56)
15-19 years	11.18%	18.36%	17.46%	17.15%
20-24 years	24.22%	38.63%	36.51%	36.13%
25-29 years	39.75%	26.99%	28.17%	29.05%
30+ years	24.84%	16.03%	17.86%	17.67%

Source: SOEP v36 (1984-2019), own calculations. Note: Column percentages per potential mediator. Birth cohort, educational level and age at migration refer to the person level, while the distribution of partnership status is based on the level of person-years. Mean ages at migration are added in parentheses.

In contrast to the birth cohort, the three regions of origin significantly differed in their educational levels.[10] Specifically, the share of higher educated women was almost twice as low among CEE (36%) or non-European (36%) than Western European (65%) migrants. Moreover, CEE (40%) and non-European (34%) migrants were less often in a partnership than respondents from Western Europe (45%). The Bonferroni test revealed that only the differences between non-European and Western European migrants were statistically significant if missing values on partnership status were excluded (N=13,947).[11] Lastly, migrants from different regions significantly differed in their (here: mean) age at migration.[12] While most migrants from CEE (39%) and non-European countries (37%) arrived between ages 20 and 24, the majority of Western European women (40%) migrated between the ages of 25 and 29 years.

[9] ANOVA: p= 0.3031; Bonferroni: CEE vs. Western Europe: p=0.983, non-European vs. Western Europe: p=1.000
[10] ANOVA: p=0.0000; Bonferroni: CEE vs. Western Europe: p=0.000, non-European vs. Western Europe: p=0.000
[11] ANOVA: p=0.0000; Bonferroni: CEE vs. Western Europe: p=0.223, non-European vs. Western Europe: p=0.000
[12] ANOVA: p=0.0001; Bonferroni: CEE vs. Western Europe: p=0.000, non-European vs. Western Europe: p=0.010

Condition 2

For another, I examined if and how the potential mediators are associated with the fertility outcome (condition 2). Given the categorical variables, I estimated specific types of correlations, which are explained and summarized in Table 8. This table shows that the positive and weak correlation between birth cohort and first childbirth was slightly statistically significant at the 10% significance level. Educational level and age at migration each revealed a negative, weak and statistically significant association with the fertility outcome. Partnership status, the only time-varying potential mediator, indicated a strong, positive and statistically significant correlation with the event of having a first birth.

Table 8: Correlations between first childbirth and potential mediators (condition 2)

	First childbirth	Observations
Birth cohort	0.04†	17,327
Educational level	-0.13***	17,327
Partnership status	0.76***	13,947
Age at migration	-0.08***	17,327

Source: SOEP v36 (1984-2019), own calculations. Note: Tetrachoric correlations were used to estimate how the binary variables birth cohort (0: <1975, 1: 1975+), educational level (0: lower, 1: higher), or partnership status (0: single, 1: having a partner, excluding missing values) are correlated with the binary first childbirth variable (0: no event, 1: event). The association between the (here) continuous age at migration variable and the binary first childbirth variable was estimated using the point-biserial correlation. †p<0.10 *p<0.05, **p<0.01, ***p<0.001.

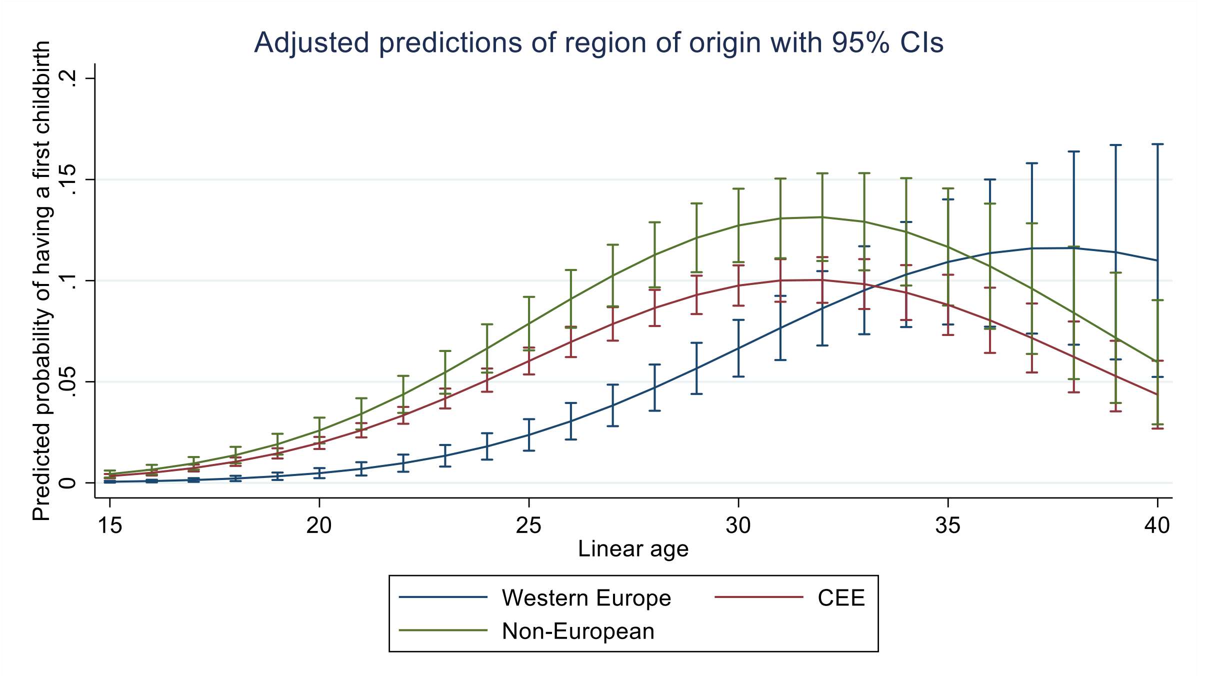
Intermediate conclusion

First, descriptive analyses suggest that CEE and non-European migrants might, on average, be more likely to become a mother and could do so at a younger age compared with Western European migrants. For one, a larger share of CEE or non-European migrants became a mother by age 40 than Western Europeans (Table 5). For another, mothers from CEE and non-European countries had, on average, their first child significantly earlier than Western European mothers (Table 6). Second, these differences might be mediated by educational levels and the age at migration (Tables 7 and 8). On average, Western European migrants had higher levels of education than the other regions, with educational levels negatively associated with the fertility outcome. Although the age at migration revealed a negative rather than positive correlation with the transition to motherhood, Western European migrants could be less likely to transition to motherhood since they were, on average, older at the time of migration in comparison to the other two regions. In contrast, the birth cohort variable is unlikely to mediate the region of origin and first childbirth since migrants from different regions did not significantly differ in this factor, although it showed a positive association with the fertility outcome. Partnership status could suppress non-European migrants' first-birth risks because they were significantly less often in a partnership than Western European migrants and because partnership revealed a positive association with first birth.

4.2 Discrete-time event-history analyses

In the first step of the discrete-time EHA, I examined how the different regions of origin differed in their time to motherhood. Therefore, I estimated the predicted probability of having a first birth for each region of origin at ages 15 to 40. Based on M1 (additionally interacting region of origin with quadratic age), Figure 7 shows that up to the early 30s, CEE and non-European immigrants were, on average, significantly more likely to transition to motherhood than Western Europeans.[13] For the former two regions, the average predicted probability of having a first birth peaked at age 32. In contrast, Western European migrants appear to postpone their first birth, as they were, on average, most likely to become a mother only at age 38.

Figure 7: Time to motherhood by region of origin



Source: SOEP v36 (1984-2019), own illustration. Note: The graph is based on M1, which additionally includes an interaction term between quadratic age and region of origin. It shows the predicted probability of having a first childbirth for each region of origin at ages 15 to 40, including 95% CIs.

In a second step, I estimated AMEs to test how the predicted probability of having a first birth was related to the regions of origin (H1) and the potential mediators (H2a-c, H3b), holding age constant. Results are presented in Table 9 (see logits in Table B1 in the appendix). In all models, I controlled for both linear and quadratic age since the inclusion of the quadratic age function significantly increased the performance of the baseline model.[14] M1 regressed first childbirth on the region of origin, given the age controls. This model indicated that the predicted probability of becoming a mother was, on average, 1.60 percentage points higher for CEE migrants and 2.97 percentage points higher for non-European migrants compared with Western European migrants, given the observed values of the age controls. The positive and statistically significant CEE and non-European effects in M1 support H1, which expected that women from these two regions have higher first-birth risks than Western European immigrants in Germany. M2 added sociodemographic characteristics to M1. Holding all else constant, the predicted probability of having a first birth was, on average, 1.07 percentage points higher for the newer birth cohort compared to migrants born before 1975. This positive and statistically significant effect in M2 rejects H2a, which expected that immigrants born since the onset of the SDT might have lower first-birth risks than migrants born earlier. In

[13] A closer look at the confidence intervals (CI) revealed that the differences in the predicted probability of having a first birth between Western European and CEE migrants were statistically significant up to age 30, while those between Western European and non-European migrants become insignificant after age 32.
[14] X^2=127.17, p=0.0000

contrast, the negative and statistically significant effect of higher education in M2 supports H2b. Accordingly, the predicted probability of becoming a mother was, on average, 3.06 percentage points lower for migrants with higher education compared to lower educated migrants, given the observed values of the other covariates. M2 also supports H2c since the model showed a positive and statistically significant relationship between having a partner and first childbirth. Specifically, the predicted probability of having a first birth was, on average, 6.72 percentage points higher if migrants had a partner than when they were single, holding all else constant. Finally, M3 introduced the age at migration to M1. It rejects H3b, as migrants who arrived at age 20 or older were, on average, less likely to become a mother than women who migrated earlier, everything else equal. While the average predicted probability of having a first birth was 4.18 percentage points lower for migrants who arrived between the ages of 20 and 24 years compared to migrants who arrived between 15 and 19 years, this negative and statistically significant effect was about twice as negative for women who migrated between ages 25 and 29 or at age 30 and older, holding all else constant. As the negative age at migration effects might depend on migrants' socialization context, additional analyses revealed that these negative effects applied to all regions of origin (Figure B).

Table 9: Discrete-time EHA using logistic regression: AMEs on the predicted probability of having a first childbirth

	Model 1	Model 2	Model 3	Model 4
Region of origin				
Western Europe	ref.	ref.	ref.	ref.
CEE	0.0160***	0.0093*	0.0107**	0.0056
	(0.003)	(0.004)	(0.004)	(0.004)
Non-European	0.0297***	0.0281***	0.0298***	0.0261***
	(0.005)	(0.005)	(0.006)	(0.006)
Birth cohort				
<1975		ref.		ref.
1975+		0.0107**		-0.0035
		(0.004)		(0.005)
Educational level				
Lower education		ref.		ref.
Higher education		-0.0306***		-0.0260***
		(0.003)		(0.003)
Partnership status				
Single		ref.		ref.
Having a partner		0.0672***		0.0623***
		(0.003)		(0.003)
Missing values		0.0389***		0.0339***
		(0.003)		(0.003)
Age at migration				
15-19 years			ref.	ref.
20-24 years			-0.0418**	-0.0237*
			(0.014)	(0.010)
25-29 years			-0.0810***	-0.0535***
			(0.014)	(0.010)
30+ years			-0.0995***	-0.0668***
			(0.014)	(0.010)
Observations	17327	17327	17327	17327

Source: SOEP v36 (1984-2019), own calculations. Note: The dependent variable indicates the risk of having a first childbirth. Linear and quadratic age are controlled. Clustered standard errors are in parentheses. *p<0.05,**p<0.01, ***p<0.001

4.3 Mediation analyses

The mediation analyses examined what factors could explain the increased first-birth risks of CEE and non-European immigrants compared to Western European migrants. Results are summarized in Table 10, showing how much of the CEE or non-European effect in M1 was reduced by including the potential mediators in M2-M4. M2 revealed that overall, socio-demographic characteristics significantly mediated 56% of the CEE effect. Although they explained 15% of the non-European effect, this mediation was not statistically significant at the 5% significance level. Moreover, the disentangled indirect effects (i.e., the effects that account for the single variable impact) revealed that these two positive mediation percentages were largely driven by higher education and the missing values of partnership status. First, the birth cohort variable did not form a significant mediator, as the small indirect disentangled effects of the post-1975 cohort were not statistically significant for both the CEE and the non-European effect compared to the pre-1975 cohort. Second, higher educational levels significantly explained 35% of the CEE effect and 25% of the non-European effect compared to lower education. Third, the disentangled effects of partnership status suggested that compared to singlehood, having a partner suppressed rather than mediated the CEE and non-European effect. However, this suppression was stronger and only significant for the non-European effect (-34%) than for the CEE (-17%) effect. In summary, M2 does not fully support H2, as only higher education significantly mediated parts of the increased first-birth risks of CEE and non-European migrants.

M3 tested the mediation of age at migration (Table 10). Overall, this variable significantly explained 39% of the CEE effect. Compared to the 15 to 19 years category, the disentangled indirect effects revealed that only migration between ages 25 and 29 significantly mediated 25% of the CEE effect. The non-European effect was not significantly explained by age at migration overall. Yet, 14% of the non-European effect was mediated by migration between ages 25 and 29 at the 10% significance level. The other categories of age at migration did not form significant mediators of the CEE and non-European effects since migration between the ages of 20 and 24 years (slightly) significantly suppressed their effects, while the mediation of migration at age 30 or older was not statistically significant compared to migration between ages 15 and 19. If the conservative significance level of 5% is relaxed to 10%, it can be concluded that M3 partially supports H3a, as migration between ages 25 and 29 (slightly) significantly mediated parts of the CEE and non-European effects. Finally, M4 included all potential mediators to test whether higher ages at migration can still partly explain the increased first-birth risks of CEE and non-European migrants when socio-demographic characteristics are taken into account (H4). This model revealed that the disentangled indirect effects of migration between ages 25 and 29 remained (slightly) statistically significant for both regional effects. Moreover, the two mediation percentages of this factor remained positive in M4 (although they were reduced compared to M3, especially regarding the CEE effect). These remaining positive mediation percentages and (slightly) significant disentangled indirect effects in M4 partially support H4.

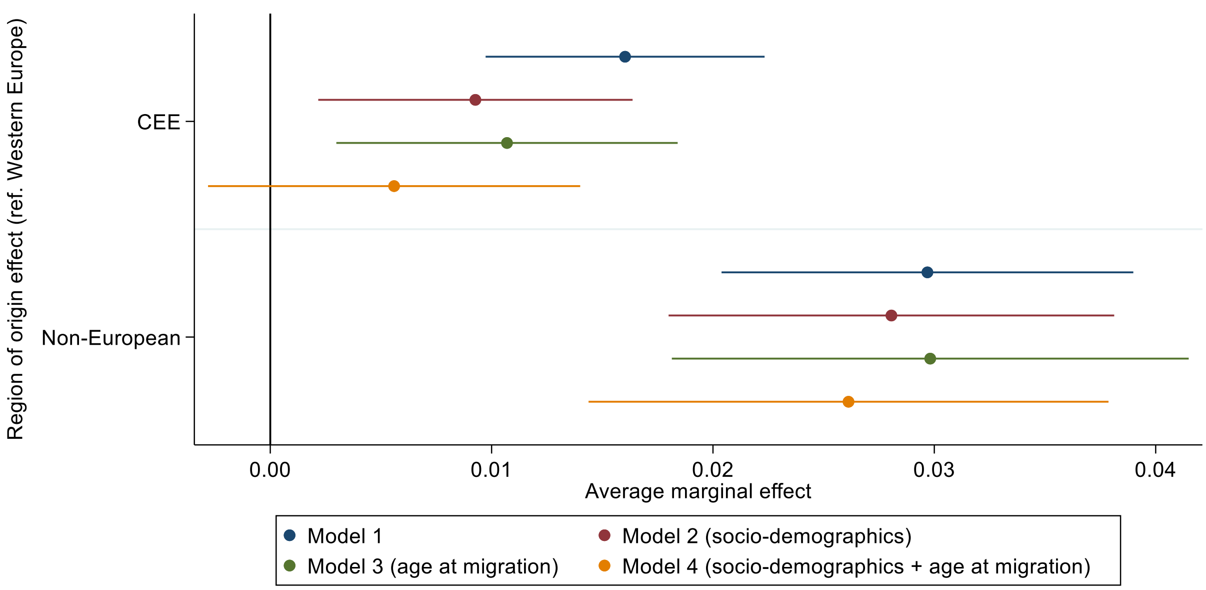
Taken together, all potential mediators significantly explained 74% of the CEE effect, whereas their mediation of the non-European effect was only 24% and not statistically significant at the 5% significance level in M4 (Table 10). In other words, age at migration and socio-demographic characteristics explained more of the CEE than the non-European effect. The same can be concluded from Figure 8, which shows how the region of origin coefficients changed across the nested models estimated based on AMEs. Accordingly, only the CEE effect was no longer significantly different from zero when socio-demographic characteristics and age at migration were added to M1 in M4.

Table 10: Summary of the mediation analysis using the KHB method based on logit-coefficients: Region of origin on first childbirth. Mediation percentages.

	CEE effect		Non-European effect	
	M2 and M3	M4	M2 and M3	M4
Socio-demographic characteristics	56.24*[a]		14.73[a]	
Birth cohort 1975+ (ref. <1975)	0.10[b]	-0.03[b]	-1.00[b]	0.30[b]
Higher education (ref. lower)	35.31***[b]	30.27***[b]	24.73***[b]	20.94***[b]
Partnership status (ref. single)				
Having a partner	-17.29[b]	-15.72[b]	-34.28*[b]	-30.79*[b]
Missing values	38.11*[b]	33.45*[b]	25.29[b]	21.93[b]
Age at migration (ref. 15-19)	39.48*[a]		14.11[a]	
20-24 years	-11.38*[b]	-6.80*[b]	-5.35†[b]	-3.98[b]
25-29 years	24.53*[b]	16.40*[b]	14.36†[b]	11.93†[b]
30+ years	26.33[b]	16.66[b]	5.10[b]	4.01[b]
All mediators		74.23**[a]		24.34[a]

Source: SOEP v36 (1984-2019), own calculations. Note: This table summarizes Tables B2-B4 in the appendix. The dependent variable indicates the risk of having a first childbirth. Western European migrants are the reference category of the CEE and the non-European effect. All models are specified according to Table 3: M2 introduces socio-demographic characteristics as potential mediators, M3 introduces age at migration as a potential mediator, and M4 introduces socio-demographic characteristics and age at migration as potential mediators. In all models, linear age and quadratic age are controlled. [a]overall indirect effect, [b]disentangled indirect effect. †p<0.10, *p<0.05, **p<0.01, ***p<0.001

Figure 8: Changes in the AMEs of regions of origin on the predicted probability of having a first birth across models



Source: SOEP v36 (1984-2019), own illustration. Note: In line with Table 9, this plot shows regression coefficients estimated using AMEs and their 95% CIs. The dependent variable indicates the risk of having a first childbirth. Western European migrants are the reference category of the CEE and the non-European effect. Linear and quadratic age are controlled. All models are specified according to Table 3.

To make sure that the analytical results were not biased by different model and variable specifications or sample selection, I performed several sensitivity and robustness analyses. First, given the statistical debate about model building and bad controls, I included each potential mediator in a separate model to test whether or not their individual effects were sensitive to other covariates in the same model (Cinelli et al., 2020). As a second sensitivity analysis, I tested alternative birth cohort measures using different years to distinguish between migrants born before and after the SDT. In the robustness analyses, I first dropped individuals who had missing values on partnership status. Second, since migration and fertility are often interrelated events, I excluded individuals who became a mother in the year they immigrated. Results can be accessed in the appendix. They proved insensitive to different model specifications (Tables C1 and C2) or alternative birth cohort measures (Tables C3 and C4), so the sensitivity analyses are in line with the main analyses. Although a higher share of CEE women (9%) than Western European (5%) or non-European (2%) women immigrated and became a mother in the same year, the exclusion of these respondents did not affect the substantive interpretation of the preceding analyses (Tables D5-D8). Also, most results were robust to the deletion of individuals with missing values on partnership status (Tables D1-D4).

5. Conclusion and discussion

5.1 Synthesis of the results

This study focused on the fertility of first-generation immigrant women living in Germany. It examined to what extent immigrants from different regions of origin differ in their transition to motherhood (RQ1) and what factors could explain these differences (RQ2). Based on the socialization and selection hypotheses, I expected that CEE and non-European immigrants might be more likely to transition to motherhood than Western European migrants and that these differences are partly due to selection into socio-demographic characteristics and differences in the age at migration. Using the "Migration Samples" and retrospective fertility data from the SOEP, I reconstructed the birth histories of 1,143 first-generation immigrant women aged 15 to 40 years who were childless before migrating to Germany in 1990 or later. Regarding RQ1, results from discrete-time EHA revealed that the average predicted probability of having a first birth was significantly higher for immigrants from CEE or non-European than Western European countries, holding age constant. When looking at this probability across the women's ages, CEE and non-European migrants were, on average, significantly more likely to become a mother by the early 30s than Western European migrants. In summary, RQ1 can be answered as follows: On average, CEE and non-European immigrant women are more likely to transition to motherhood and do so at a younger age than Western European immigrant women.

To investigate RQ2, I additionally conducted a mediation analysis. More specifically, I applied the KHB method to test whether differences in socio-demographic characteristics and the age at migration partly mediated the increased first-birth risks of CEE and non-European migrants compared to their Western European counterparts. According to this analysis, higher education and age at migration between 25 and 29 years formed significant and joint mediators, explaining more of the CEE than the non-European effect. Their mediation was due to two facts. First, Western European migrants had, on average, higher levels of education and a larger share of women who migrated between ages 25 and 29 compared to CEE or non-European migrants. Second, immigrants with higher education or older ages at migration were, on average, less likely to become a mother than migrants who were less educated or migrated between 15 and 19 years. In contrast, birth cohort and partnership status could not explain the increased first-birth risks of CEE and non-European migrants. The birth cohort variable did not form a significant mediator, as the regions of origin did not significantly differ in this factor, although migrants born in 1975 or later were, on average, more likely to become a mother than migrants born earlier. Having a partner suppressed rather than mediated the increased first-birth risks of non-European migrants since they were less often in a partnership than Western European migrants and because having a partner revealed a positive effect on the transition to motherhood compared to single migrants. In contrast to the CEE effect, the mediation analysis revealed that much of the non-European effect remained unexplained overall. To sum up, RQ2 can be answered as follows: On average, Western European immigrant women's higher levels of education and older ages at migration partly explained why they were less likely to transition to motherhood than CEE or non-European immigrant women.

5.2 Discussion and contribution of the results

The present research contributes to the literature on migrant fertility in several ways. Specifically, it shed light on fertility differences between recent migrant groups, provided explanations for these differences, and added to the empirical relevance of the socialization and selection hypotheses. First, this research compared the transition to motherhood across first-generation immigrant women from different regions of origin if they migrated childless to Germany in 1990 or later. In contrast, previous research has often looked at fertility differences between immigrants and natives or between migrants from only a few countries of origin. Specifically, in the German case, studies focused on first-generation immigrants from former guest-worker countries, comparing their fertility with Germans or other migrant groups (e.g., Erman, 2021; Krapf & Wolf, 2015; Kreyenfeld & Krapf, 2017; Mayer & Riphahn, 2000; Milewski, 2007, 2010a, 2010b; Schmid & Kohls, 2009; Wolf, 2014, 2016). Moreover, many of these immigrants arrived in Germany before the 1990s. Evidence from this literature highlighted the increased first-birth risks of Turkish migrants compared to German natives or other migrant groups. Using the relatively new "Migration Samples" of the SOEP, this research revealed that different regions of origin affect the transition to motherhood of immigrants in Germany if more recent migrants from almost 90 different countries of origin are considered. In terms of odds, the analysis revealed that, on average, the first-birth risks of CEE migrants were elevated by 63%, and those of non-European migrants by 120% compared with Western European migrants.[15] These results are comparable with previous research showing that the odds of having a first birth were increased by 23% among CEE migrants, 149% among migrants from Africa and the Middle East, and 34% among migrants from America, Asia and Oceania compared with Western European migrants (Wolf & Kreyenfeld, 2020).[16]

Second, this study revealed what factors could explain the fertility differences between regions of origin. In the case of Germany, circular migration and religious affiliation were found to partly explain why Western European immigrants were, on average, less likely to have a first child than migrants from other regions (Wolf & Kreyenfeld, 2020). In contrast, education was not assumed to mediate the region of origin effects on first-birth risks (only on higher-order birth risks). Also, the cited study did not include the age at migration. The current analyses suggest that higher education and migration between ages 25 and 29 partly contributed to the lower first-birth risks of Western European immigrants compared to migrants from other regions. It should be noted, however, that Western Europeans' relatively high average age at migration differs from Destatis data discussed in section 2.3.2. In the analytical sample, the mean age at migration of Western European women (26 years) significantly exceeded that of non-European (25 years) or CEE (24 years) women (Table 7). In contrast, Destatis data revealed that the mean age at migration was lower among migrants from Western European (21 years) than non-European (23 years) or CEE (25 years) countries (Destatis, 2022a). Migration between ages 25 and 29 formed a significant mediator only because this factor was, on average, associated with lower rather than higher first-birth risks compared to women who migrated between 15 and 19 years. Hence, it remains to be clarified if Western Europeans' increased ages at migration are an artifact of selecting childless migrants or if they are because Western European migrants have different schedules regarding their educational and work lives than other migrant groups. Given their relatively high average levels of education, Western European women may be more likely to complete

[15] (exp(0.489207) - 1)*100 = 63%; (exp(0.7872406) - 1) = 120% (Table B1)

[16] The first-birth risks of CEE migrants might be lower in the authors' analysis than in this one since they restricted the analysis to the post-migration period. If I excluded observations before the migration, CEE migrants' odds of having a first birth were, on average, only 36% higher than those of Western Europeans, given the age controls.

education in the origin country later than women living in CEE or non-European countries and only then decide to leave their country to find a job in Germany, for example.

In addition to education and the age at migration, I tested whether migrants' partnership status and birth cohort mediated the fertility differences across regions of origin. Considering migrants' partnership status contributes to previous research. Specifically, in the German case, previous studies stressed the strong interrelation between marriage and migrant fertility but neglected nonmarital partnerships (e.g., Cygan-Rehm, 2014; Erman, 2021; Milewski, 2007, 2010a; Wolf, 2016). The present study revealed that, on average, having a partner (whether married or not) significantly increased immigrants' chances of becoming a mother compared with single migrants. Yet, the mediation analysis indicated that having a partner did not account for the region of origin effects since non-European women, in particular, were less often in a partnership than Western European migrants. This finding contrasted with United Nations data presented in section 2.3.1. They showed that the share of women in a marriage or union was higher among women *living* in non-European regions such as Asia or Africa than among Western European residents. The reverse finding for women who *immigrated* to Germany suggests that migration from non-European countries could be more often associated with partner separation than migration within Europe. Another reason could be that non-European immigrant women might be less likely to find a new partner in Germany than Western European migrants. In contrast, the birth cohort neither significantly mediated nor suppressed the region of origin effects since the regions were not selective toward birth before or after the mid-1970s. Moreover, the increased first-birth risks of the newer birth cohort rejected the expectation that immigrants born in 1975 or later might be less likely to become a mother than migrants born before this period. Since previous studies on migrant fertility in Germany found that, on average, newer birth cohorts had either lower or not significantly different first-birth risks than older cohorts, the independent birth cohort effect on migrant fertility remains to be clarified (Krapf & Wolf, 2015; Milewski, 2007, 2010a, 2010b; Wolf, 2014).

Third, the current research contributes to the empirical relevance of the socialization and selection hypotheses. Specifically, the analyses suggest that they are complementary rather than contradictory, as there was support for both hypotheses. For one, the *socialization hypothesis* received support from the increased first-birth risks of CEE and non-European migrants compared to Western European migrants. Assuming that place of birth is where migrants were socialized, the former two groups thus partly reflected their socialization context, in which, on average, women are more likely to become mothers and do so at a younger age than women from Western Europe. For another, there was support for the *selection hypothesis* since CEE and non-European migrants' increased birth risks were partly explained by their lower average levels of education compared with Western European migrants. The simultaneous relevance of the two hypotheses is in line with previous research findings showing that migrants from different places of origin significantly differ in their fertility (compared to other origin groups, natives or non-migrants), in part because they self-select into different educational levels or years, which are strongly negatively related to fertility (e.g., Gabrielli et al., 2007; Pailhé, 2017; Schmid & Kohls, 2009; Wolf & Kreyenfeld, 2020). However, the *socialization hypothesis* did not find support in terms of the age at migration. Similar to previous research, the current EHA showed that compared with migrants who arrived between ages 15 and 19, those who migrated later in life were, on average, less likely to transition to motherhood (e.g., Mussino & Strozza, 2012; Wolf, 2014, 2016). This negative relationship raises the question of whether it is because women who migrated childless at higher ages had fewer fertile years left in Germany or whether they migrated for different reasons compared to those who arrived in adolescence or young adulthood.

5.3 Limitations and strengths in relation to the validity of the results

Limitations

Like all studies, this work presents some limitations. Specifically, the validity of results might be affected by variable and sample selection. First, regarding the region of origin variable, it must be noted that the three regions are not homogenous in terms of fertility, socio-demographic and migration-specific characteristics. For example, the descriptive analysis revealed that within each region, mothers deviated by an average of 5 years from the regional mean age at first childbirth (Table 6). In the ideal case, I would have examined the countries of origin individually or in more differentiated regions. However, due to the small sample size per country, I had to group them into three broad regions. This grouping largely corresponded to the classification scheme used by previous research in the German context (Wolf & Kreyenfeld, 2020). Regarding the birth cohort variable, the validity of the results might be affected by the fact that I chose the year 1975 to distinguish between migrants born before or after the SDT. For one, only a small proportion of respondents (17%) belonged to the older cohort. For another, 1975 might not distinguish between the pre-SDT and post-SDT cohorts equally accurately for all places of origin since fertility declines and postponements started at different times worldwide. This threshold may apply more to migrants from Northwestern Europe, Northern America and Oceania than to respondents from (1) Southern Europe, CEE, Latin America or East Asia, where the fertility transition occurred later, and (2) African countries, which are still in the early transition period with high fertility rates (Bianchi, 2014; Bongaarts, 2017; Zaidi & Morgan, 2017). Moreover, the effect of the SDT on individuals' childbearing behavior might be delayed since people do not adopt social norms immediately. However, no negative relationship between birth cohort and first-birth risks was found when testing later thresholds (Table C3). Regarding the partnership status variable, 20% of values were missing, which, on average, were associated with higher first-birth risks compared to single migrants (Table 9). Therefore, I used an extra category including missing values while testing whether the findings were robust to the deletion of individuals with missing observations (Tables D1-D4). As in the main analysis, the robustness checks indicated that compared to singlehood, having a partner showed a positive effect on the transition to motherhood and that this factor did not form a significant mediator in the region of origin effects. Concerning the age at migration, it should be noted that its effects likely depend on whether migrants were socialized in a relatively high or low fertility context. Therefore, had the sample size been larger, an informative test for the socialization hypothesis would have been to interact the region of origin with age at migration. Lastly, in addition to the observed covariates, other factors such as employment status might also account for the fertility differences across regions of origin. For example, CEE or non-European immigrants could be less likely to work in Germany than Western European immigrants, given their relatively lower average levels of education. Unemployed women, in turn, may be more inclined to become a mother if they have more time for childbearing and child-raising compared with employed women (Gabrielli et al., 2007; Milewski, 2007, 2010a).

Second, the validity of the results might be affected by sample selection. Since this study focused on migrant fertility in the destination country rather than the country of origin, I selected immigrants who were childless before they immigrated to ensure that the event occurred only from the year of arrival in Germany. Although results were robust to the exclusion of individuals who had their first child in the same year they arrived, it should be noted that they accounted for 11% of all birth events (n=81) (Tables D5-D8). Given this interrelation between migration and the transition to motherhood, the selection of migrants who were childless before the migration is likely to have led to an overestimation of actual first-birth rates. For Sweden, there is evidence that the first-birth rates of foreign-born women from non-Nordic countries are overestimated by 11% if the retrospective fertility data were collected 25 years back in time (Andersson & Sobolev, 2001). In this study's sample, retrospective data on migrants' first childbirths were collected with a maximum time lag of 24 years. Taking the findings for Sweden as a reference, one could assume that by selecting immigrants who were childless before they migrated to Germany, their actual first-birth rates were overestimated by up to about 10% in extreme cases. In addition, previous research findings suggest that this overestimation might be stronger for migrants from non-European than CEE or Western European countries since stronger arrival effects were found for migrants from Africa and the Middle East than for Western European or CEE migrants (Wolf & Kreyenfeld, 2020). The same can be concluded from additional analyses I conducted. They revealed that the average distance between the age at first birth and age at migration was only 2.7 years for non-European migrants compared to 3.7 years for CEE migrants and 4.1 years for Western European migrants. Another indication of the selectivity of the sample comes from the finding that Western European migrants' average predicted probability of having a first child did not peak until the late 30s. Although most Western European respondents came from very "low and late" fertility contexts like Spain or Italy, the MAM in these countries did not exceed 32 years in 2018 (Eurostat, 2021). Such a late peak could be because I observed a highly selective group of only a few Western European women aged 15 to 40, of whom 48% remained childless throughout the observation period (Table 5). Moreover, given the censoring criterion of age 40, I had to restrict the sample to migrants who arrived by age 38. In short, sample selection was partly based on the ages over which respondents were observed.

Strengths

The present study also has some strengths. Specifically, the validity of the results is supported by the variety of countries of origin, the SOEP data, and the analytical approach that yielded results similar to previous research findings. First, this study compared first-generation immigrants from three regions of origin, considering almost 90 different countries. In contrast, German research focused on only a few countries of origin, such as the former guest worker countries (e.g., Erman, 2021; Krapf & Wolf, 2015; Kreyenfeld & Krapf, 2017; Mayer & Riphahn, 2000; Milewski, 2007, 2010a, 2010b; Schmid & Kohls, 2009; Wolf, 2014, 2016). However, a comparison of several regions of origin is only meaningful if a corresponding number of countries per region is included. Second, the present study considered that the relevance of the individual countries of origin has multiplied since the 1990s. Before this period, most people migrated to Germany from Turkey, other former guest-worker countries, or the former Soviet Union. Meanwhile, the composition of immigrants has changed as immigration from CEE, non-European, and Western EU countries has increased since the 1990s. Therefore, this study used the "Migration samples" of the SOEP. They account for the change in migration, as they oversampled households with individuals who have migrated to Germany from the Southern part of Western Europe, CEE and Muslim countries in 1995 or later. Moreover, section 3.4 revealed that the top ten countries of origin in the analytical SOEP sample partly reflected the top ten foreign citizenships of the foreign-born population in a similar period. In addition, retrospective fertility data allowed me to reconstruct the women's birth histories. Thus, the women were observed over parts of their lives, which is consistent with the life course approach.

Third, this research systematically analyzed how and why migrants from different regions of origin differ in their transition to motherhood. On the one hand, I conducted discrete-time EHA using logistic regression to examine potential fertility differences between the regions. This method is suitable for longitudinal event-history data since the event of interest can be modeled as time-varying and binary, depending on time and other covariates. Moreover, this method revealed that, on average, CEE and non-European migrants had higher first-birth risks than Western European migrants. Since these results replicated previous research findings, this supports the validity of the results (Wolf & Kreyenfeld, 2020). On the other hand, I systematically studied to what extent socio-demographic characteristics and the age at migration might explain the fertility differences between regions of origin. As a first step, I conducted descriptive analyses to examine how migrants from different regions of origin might differ in these potential mediators, as well as EHA analyses to test the relationship between these potential mediators and the transition to motherhood. Results from this EHA analysis were in line with earlier study findings showing that in Germany and other European destinations, immigrants who were more educated or at least 25 years at the time of migration had, on average, lower fertility levels than those who were less educated or migrated in young adulthood (e.g., Erman, 2021; Guarin & Bernardi, 2015; Mussino & Strozza, 2012; Wolf, 2016). The same studies also align with the finding that migrants who had a partner were, on average, more likely to become a mother than single migrants. In the second step, I could use the results from the descriptive and EHA analyses to explain why some factors turned out to be significant mediators in the mediation analysis while others did not. For example, education and age at migration formed significant mediators between the region of origin and transition to motherhood because (1) on average, Western European migrants were more educated and migrated more often between ages 25 and 29 than migrants born in other regions, and (2) higher education or migration between ages 25 and 29 indicated a negative effect on the average predicted probability to become a mother compared to lower education or migration between 15 and 19 years. Their mediation replicated previous research findings, which showed that the inclusion of education or age at migration reduces the fertility differences between migrants and natives or other groups (e.g., Erman, 2021; Gabrielli et al., 2007; González-Ferrer et al., 2017; Toulemon, 2004; Wolf & Kreyenfeld, 2020). However, unlike other studies that examined potential mediators by comparing logit coefficients across nested NLPMs, this study used the KHB method to account for rescaling and the change in the error fit across nested NLPMs. If rescaling is not taken into account, mediation effects may be underestimated. Finally, the robustness and sensitivity analyses largely supported the validity of the results.

5.4 Research and policy recommendations

The present study revealed that CEE and non-European first-generation immigrant women who migrated childless to Germany in 1990 or later were, on average, more likely to transition to motherhood than Western European migrant women partly because they had lower average levels of education and less often arrived between ages 25 and 29. These findings have implications for future research and policymaking. First, researchers could examine whether they also apply to male immigrants. I decided to focus on women to provide alternative explanations for the recently found fertility differences across women from different regions of origin (Wolf & Kreyenfeld, 2020). In addition, men's and women's first-birth risks might partly depend on different factors. For example, research has shown that Turkish immigrant men often migrate to Germany alone, then marry a woman living in Turkey who subsequently follows her new husband to Germany (Wolf, 2014, 2016). This finding suggests that men might be more likely to migrate for economic reasons, while women's migration is more family-related. Hence, a second recommendation for future research would be to examine whether employment status can partly explain differences in the transition to parenthood of male and female immigrants from different regions of origin in Germany. Third, much of the fertility differences between non-European and Western European migrants remained unexplained. Future research should therefore examine what other factors could explain the increased first-birth risks of non-European migrants. Fourth, since this study was based on a country of destination approach and therefore did not consider births in the country of origin, it would be revealing to investigate whether German immigrants from different regions of origin also differ in their childbearing behavior prior to migration. The previously found arrival effects of non-European migrants suggest that they might be more likely to postpone their first child shortly before migration than Western European migrants (Wolf & Kreyenfeld, 2020). Fifth, this study focused on the transition to first birth. The next step would be to examine higher-order births. Lastly, the study's findings raise the question of whether the first-birth risks of Western European migrants are more similar to the relatively low rates of German natives than are the first-birth risks of CEE or non-European migrants.

For policymakers, an important implication from the analyses might be that immigrant fertility depends on the composition of immigrants. While section 2.2 highlighted that immigration policies in favor of certain "types of migrants" lead to selective immigration, the present analysis showed that Western European migrants had, on average, lower first-birth risks than other regions of origin since they were selective toward higher levels of education. Bringing these two aspects together suggests that immigration policies that facilitate the migration of highly educated or skilled immigrants (such as the EU Blue Card) might contribute to an increase in the number of migrants with higher education, which could be associated with a decrease in the first-birth rates among the foreign-born population. Immigrant fertility, in turn, contributes to overall fertility in the receiving country (Sobotka, 2008). In Germany, overall TFR increased by 0.15 children per woman, from 1.39 in 2011 to 1.54 in 2019 (BIB, 2021). This increase was more due to an increase in TFR among women with foreign (+0.48) than German (+0.1) citizenship. Meanwhile, as overall TFRs are declining again and have been below replacement level for decades, low overall fertility and rising life expectancy increase the economic burden on the future shrinking working-age population to provide for an increasing elderly population (Destatis, 2022d; UNPD, 2019). As foreign-born immigrants account for a significant share of the total population (12% in 2021), their higher birth rates compared to the native population could (slightly) counteract the threatening effect of low fertility on pension and social systems in Germany (Destatis, 2022b, 2022c). Although the transition to motherhood does not refer to the total number of children per woman, having a first child at a young age may[17] increase a woman's chance of having more children during the rest of her reproductive life (e.g., Tomkinson, 2019). Therefore, to the extent that policymakers are interested in stimulating overall fertility levels in Germany, the finding that due to the lower educational levels of CEE and non-European immigrant women, they are more likely to transition to motherhood compared to Western European migrants suggests supporting immigration not only of higher-educated but also lower-educated people. Most importantly, however, the way in which immigrants are integrated and received by the native population contributes to who and how many people migrate to Germany.

[17] However, note that the negative relationship between age at first birth and completed fertility is controversial and may apply more to the individual than aggregate level (Beaujouan & Toulemon, 2021).

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Appendix

Appendix A: Destatis and SOEP data

Table A1: Total number of foreign-born immigrants in Germany by selected CEE-EU citizenships (2011-2020)

Year	Bulgaria	Croatia	Poland	Romania
2011	91,471	173,350	451,006	155,074
2012	115,636	175,493	513,397	199,745
2013	142,169	189,957	588,062	259,999
2014	176,755	214,131	648,670	344,540
2015	217,736	249,623	711,180	436,967
2016	250,330	284,270	747,920	510,800
2017	294,185	319,145	827,020	592,665
2018	317,030	345,375	815,655	657,190
2019	336,355	362,525	813,985	700,220
2020	360,365	371,610	814,055	741,180

Source: Destatis (2022c), own illustration.

Table A2: Reflection on data quality and ethical considerations regarding the SOEP data

Quality of the data	“Migration Samples” The data quality of the “Migration Samples” may be affected by sampling bias, non-response bias, and response bias. First, given the IEB sampling frame, the samples might be selective towards SOEP respondents who consented to link their survey with administrative data. Although the consent rate did not exceed 58%, analyses suggest that “consenters” and “non-consenters” did not systematically differ in a wide of factors (Eisnecker et al., 2017). Only respondents from large households and Arabic or Muslim countries were significantly less likely to consent. As the “Migration Samples” deliberately oversampled migrants from these countries, this bias might be reduced. Apart from this, however, the “Migration Samples” are not representative of civil servants and self-employed individuals, as they were not covered by the IEB sampling frame. Second, the longitudinal study design makes the data more susceptible to nonresponse bias if certain households cannot be reached or refuse to participate in follow-ups (Kühne & Kroh, 2017). Migrants may be less likely to participate in the survey if they have few German skills or are unfamiliar with the federal agency responsible for the IEB. Although the response rates of M1 (32%) and M2 (28.8%) were relatively low, only a few migrant groups (Polish, Greek and Turkish immigrants) were significantly less likely to participate than others. Third, migrants’ responses may be biased if they had difficulties understanding questions or if interviewers were poorly trained. The SOEP addresses this bias by providing translation assistance and training interviewers to survey migrant households (Brücker et al., 2014; SOEP, 2013). (Retrospective) data on partnership status The quality of retrospective data on partnership status might be affected (more than fertility data) by response error if respondents cannot recall the exact period of a short partnership that occurred far back in time. Another limitation is that biocouply data provide only annual information on partnership status. However, since an individual can be both single and have one or more partners in the same year of life, the age years indicating the beginning and end of a partnership status overlap in the biocouply data file (Table A6). Therefore, the reconstructed partnership histories do not reflect respondents’ exact partnership histories.
Traceability of data subjects	The SOEP data are based on personal data that contain detailed information about the data subjects and the household in which they live. These micro-data could make it possible to identify the data subjects. Therefore, the data have been anonymized by the data provider so that the observations are no longer directly traceable.
Informed consent of participants	Before participating in the SOEP study, the households sampled received information on the purpose of the data collection, the group of people who have access to and process their data, data sharing risks and their data protection rights (SOEP, 2020). Data subjects were not interviewed until they consented to participate in the study based on this information. Since the “Migration Samples” can be linked with administrative data, the respondents were asked to permit this linkage at the end of the interview (Eisnecker & Kroh, 2017).
Data access and confidential storage	The SOEP data are only available for independent scientific research and teaching purposes in universities and other research institutes. Therefore, my supervisor at the University of Groningen and I had to apply for a data distribution contract that complies with the German data protection law. My supervisor then signed the contract with the *Deutsches Institut für Wirtschaftsforschung* (DIW), responsible for the data. This agreement states that the data may only be used for this specific research project. By signing the contract, we were registered as SOEP users and authorized to order the data. The DIW then sent me an email with a link to download the data for a limited time. I could only download and access the data using two passwords sent to me via text message. In light of this security procedure, I am aware of the sensitivity of the micro-data and make every effort to treat them confidentially. I will not share them with third parties and store them so that third parties do not have access to them. The right to use the SOEP data terminates with the end of the research project.
Data processing	The contract stipulates that the data may only be processed and published anonymously and in aggregated form so that no conclusions can be drawn about the data subjects. We have been made aware that any form of re-anonymization can be punished as a breach of data protection regulations.

Table A3: Classification of countries of origin by region of origin

Region of origin	**Country of origin**
Western Europe	Austria, Belgium, Denmark, Finland, France, Great Britain, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland
CEE	Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kosovo-Albania, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldavia, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
Non-European	Afghanistan, Brazil, Cameroon, China, Columbia, Congo, Cuba, Dominican Republic, Ecuador, Ghana, Hong Kong, India, Indonesia, Iran, Iraq, Jamaica, Japan, Jordan, Kenya, Korea, Kuwait, Laos, Lebanon, Malaysia, Mexico, Mongolia, Morocco, Nepal, Nigeria, Pakistan, Palestine, Peru, Philippines, South Africa, Sri Lanka, Syria, Taiwan, Thailand, Tunisia, Turkey, USA, Venezuela, Vietnam

Note: Own illustration. This table shows how different countries of origin were grouped into three regions of origin. The classification scheme is based on that of Wolf & Kreyenfeld (2020), with their "Africa/the Middle East" and "Other" (e.g., America, Asia, Oceania) categories combined into one non-European category.

Table A4: Distribution of countries of origin by region of origin

Western Europe		CEE		Non-European	
Country	Persons	Country	Persons	Country	Persons
Spain	45	Poland	164	Turkey	78
Italy	40	Romania	157	Morocco	16
Greece	28	Russia	74	India	13
Austria	13	Kazakhstan	62	Tunisia	11
France	13	Kosovo-Albania	38	China	11
Total	161		730		252

Source: SOEP v36 (1984-2019), own calculations.

Table A5: Type of immigration by region of origin

Type of immigration	Region of origin		
	Western Europe	CEE	Non-European
Person of German descent from Eastern Europe	0 (0.00%)	82 (11.23%)	0 (0.00%)
German who was born and raised abroad	2 (1.24%)	0 (0.00%)	0 (0.00%)
Citizen of an EU country (up to 2009 European communities)	69 (42.86%)	173 (23.70%)	9 (3.57%)
Other foreigner	90 (55.90%)	475 (65.07%)	243 (96.43%)
Total	161 (100.00%)	730 (100.00%)	252 (100.00%)

Source: SOEP v36 (1984-2019), own calculations. Note: Number of persons. Column percentages are in parentheses.

Interpretation: This table shows that respondents' type of immigration by region of origin is partially consistent with the study focus highlighted in section 2.2. For example, almost all respondents born in non-European countries (96%) immigrated as "other foreigners" (including family migrants and students, for example). Also, most CEE migrants (65%) immigrated as "other foreigners", while about one-third of them immigrated either as EU citizens (if the country of which they were citizens at the time of migration was a member of the EU by 2009) or as ethnic Germans. However, contrary to what was argued in section 2.2, Western European women include larger shares of "other foreigners" (56%) than EU migrants (43%). Therefore, I additionally looked at whether "other foreigners" from Western Europe were more likely to have immigrated before or after their country of origin implemented the Schengen rules. Since few of them migrated before their country of origin implemented the Schengen rules, the high share of "other foreigners" among Western European immigrants might indicate that the country of birth does not necessarily correspond to respondents' citizenship at the time of the migration.

Table A6: Partnership history of respondent i according to *biocouply* data and the retrospective partnership status variable

Partnership status of respondent i	Partnership history according to the	
	original *biocouply* data	retrospective partnership status variable
Single	17-21	17-20
Having a partner	21-22	21-22
Single	22-26	23-25
Having a partner	26-36	26-36

Source: SOEP v36 (1984-2019), own illustration.

Interpretation: This table shows how retrospective data on partnership status are stored in the *biocouply* data file (see left column). As they are only provided in yearly intervals (although individuals can have several changes in partnership status in the same year of life), the ages for different partnership statuses overlap. For example, *biocouply* data suggest that respondent i was both single and had a partner at age 21. I created a variable indicating whether or not a respondent had a partner at a given age. According to this example, the variable indicates that respondent i had a partner at age 21. It should be borne in mind that this indicator does not reflect respondents' actual partnership histories as it overestimates the period they had a partner (see right column).

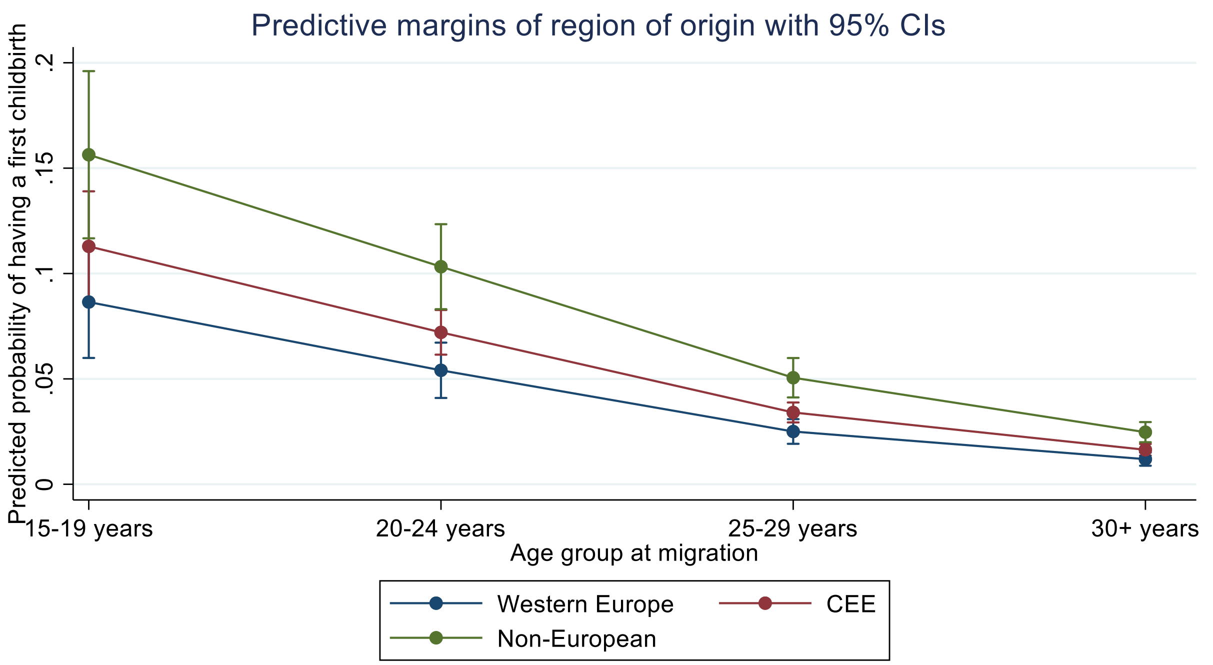
Appendix B: Multivariate analyses

Table B1: Discrete-time EHA using logistic regression: log-odds of having a first childbirth

	Model 1	Model 2	Model 3	Model 4
Region of origin				
Western Europe	ref.	ref.	ref.	ref.
CEE	0.489***	0.280*	0.327*	0.168
	(0.109)	(0.117)	(0.131)	(0.134)
Non-European	0.787***	0.706***	0.757***	0.646***
	(0.124)	(0.131)	(0.151)	(0.151)
Birth cohort				
<1975		ref.		ref.
1975+		0.295**		-0.092
		(0.111)		(0.125)
Educational level				
Lower education		ref.		ref.
Higher education		-0.803***		-0.700***
		(0.082)		(0.092)
Partnership status				
Single		ref.		ref.
Having a partner		4.000***		3.702***
		(0.383)		(0.382)
Missing values		3.420***		3.056***
		(0.389)		(0.391)
Age at migration				
15-19 years			ref.	ref.
20-24 years			-0.541***	-0.389**
			(0.163)	(0.150)
25-29 years			-1.373***	-1.104***
			(0.161)	(0.158)
30+ years			-2.142***	-1.631***
			(0.176)	(0.183)
Constant	-15.086***	-15.391***	-15.103***	-15.583***
	(0.758)	(0.864)	(0.798)	(0.880)
Observations	17327	17327	17327	17327
Log likelihood	-2805.13	-2525.16	-2651.23	-2450.22

Source: SOEP v36 (1984-2019), own calculations. Note: The dependent variable indicates the risk of having a first childbirth. Linear and quadratic age are controlled. Clustered standard errors are in parentheses. *p<0.05, **p<0.01, ***p<0.001

Figure B: Predicted probabilities of having a first childbirth by region of origin at different ages at migration



Source: SOEP v36 (1984-2019), own illustration. Note: Based on M3, the graph plots the predicted probability of having a first childbirth for each region of origin at different ages at migration, holding constant the observed values of linear and quadratic age.

Interpretation: The figure shows that for migrants from all regions of origin, the predicted probability of having a first childbirth was, on average, highest if they migrated between the ages of 15 and 19, decreasing with each higher age at migration category, given the observed values of the age controls. A closer look at the CIs revealed that only non-European migrants significantly differed from Western European migrants in their predicted probability of having a first childbirth at each age at migration category, given the observed values of the age controls.

Table B2: Mediation analysis using the KHB method based on logit-coefficients: Region of origin on first childbirth. Socio-demographics as potential mediators (M2).

Decomposition table

First childbirth	Coefficient	SE	z	P>z	95% CI	
CEE effect (ref. Western Europe)						
Reduced model M1 (total effect)	0.639	0.115	5.550	0.000	0.413	0.864
Full model M2 (direct effect)	0.280	0.117	2.400	0.017	0.051	0.508
Difference (indirect effect)	0.359	0.159	2.260	0.024	0.048	0.671
Non-European effect (ref. Western Europe)						
Reduced model M1 (total effect)	0.828	0.131	6.340	0.000	0.572	1.084
Full model M2 (direct effect)	0.706	0.131	5.390	0.000	0.449	0.963
Difference (indirect effect)	0.122	0.158	0.770	0.440	-0.188	0.432

Summary table

Region of origin effect	Confounding ratio	Confounding percentage	Rescaling factor
CEE effect	2.285	56.240	1.306
Non-European effect	1.173	14.730	1.052

Disentangle table

Potential mediator (Z-variable)	Coefficient	SE	Percentage difference	Percentage reduced
CEE effect (ref. Western Europe)				
Birth cohort (ref. <1975)				
1975+	0.001	0.011	0.180	0.100
Educational level (ref. lower)				
Higher education	0.226	0.041	62.790	35.310
Partnership status (ref. single)				
Having a partner	-0.110	0.108	-30.740	-17.290
Missing values	0.244	0.115	67.770	38.110
Non-European effect (ref. Western Europe)				
Birth cohort (ref. <1975)				
1975+	-0.008	0.014	-6.820	-1.000
Educational level (ref. lower)				
Higher education	0.205	0.045	167.900	24.730
Partnership status (ref. single)				
Having a partner	-0.284	0.124	-232.780	-34.280
Missing values	0.209	0.135	171.700	25.290

Source: SOEP v36 (1984-2019), own calculations. Note: This illustration shows the decomposition, summary, and disentangle tables of M2 estimated using the KHB method. Birth cohort, educational level and partnership status are treated as potential mediators (Z-variables) in the effects of the region of origin (key variable) on first childbirth (dependent variable). Linear and quadratic age are defined as control variables (concomitants). Information from these three tables is summarized in Table 10. Specifically, I used the p-values of the indirect effects from the decomposition table and the confounding percentages from the summary table to indicate the mediation percentages and significance levels of the overall indirect effects in Table 10. From the disentangle table, I used the percentage reduced and the coefficients divided by their standard errors to display the mediation percentages and significance levels of the disentangled indirect effects in Table 10. Note that I used seven rather than three decimals of the coefficients and standard errors to calculate the p-values of the disentangled indirect effects.

Table B3: Mediation analysis using the KHB method based on logit-coefficients: Region of origin on first childbirth. Age at migration as a potential mediator (M3).

Decomposition table

First childbirth	Coefficient	SE	z	P>z	95% CI	
CEE effect (ref. Western Europe)						
Reduced model M1 (total effect)	0.540	0.130	4.140	0.000	0.285	0.796
Full model M3 (direct effect)	0.327	0.131	2.510	0.012	0.071	0.583
Difference (indirect effect)	0.213	0.091	2.340	0.019	0.035	0.392
Non-European effect (ref. Western Europe)						
Reduced model M1 (total effect)	0.881	0.152	5.790	0.000	0.582	1.179
Full model M3 (direct effect)	0.757	0.151	5.010	0.000	0.461	1.053
Difference (indirect effect)	0.124	0.091	1.370	0.170	-0.053	0.302

Summary table

Region of origin effect	Confounding ratio	Confounding percentage	Rescaling factor
CEE effect	1.652	39.480	1.105
Non-European effect	1.164	14.110	1.119

Disentangle table

Potential mediator (Z-variable)	Coefficient	SE	Percentage difference	Percentage reduced
CEE effect (ref. Western Europe)				
Age at migration (ref. 15-19)				
20-24 years	-0.062	0.026	-28.830	-11.380
25-29 years	0.133	0.063	62.130	24.530
30+ years	0.142	0.091	66.700	26.330
Non-European effect (ref. Western Europe)				
Age at migration (ref. 15-19)				
20-24 years	-0.047	0.027	-37.950	-5.350
25-29 years	0.127	0.072	101.790	14.360
30+ years	0.045	0.106	36.160	5.100

Source: SOEP v36 (1984-2019), own calculations. Note: This illustration shows the decomposition, summary, and disentangle tables of M3 estimated using the KHB method. Age at migration is treated as a potential mediator (Z-variable) in the effects of the region of origin (key variable) on first childbirth (dependent variable). Linear and quadratic age are defined as control variables (concomitants). Information from these three tables is summarized in Table 10.

Table B4: Mediation analysis using the KHB method based on logit-coefficients: Region of origin on first childbirth. Socio-demographics and age at migration as potential mediators (M4).

Decomposition table

First childbirth	Coefficient	SE	z	P>z	95% CI	
CEE effect (ref. Western Europe)						
Reduced model M1 (total effect)	0.650	0.131	4.980	0.000	0.394	0.906
Full model M4 (direct effect)	0.168	0.134	1.250	0.211	-0.095	0.430
Difference (indirect effect)	0.483	0.181	2.660	0.008	0.127	0.838
Non-European effect (ref. Western Europe)						
Reduced model M1 (total effect)	0.853	0.151	5.640	0.000	0.557	1.149
Full model M4 (direct effect)	0.646	0.151	4.270	0.000	0.349	0.942
Difference (indirect effect)	0.208	0.180	1.150	0.249	-0.145	0.561

Summary table

Region of origin effect	Confounding ratio	Confounding percentage	Rescaling factor
CEE effect	3.880	74.230	1.329
Non-European effect	1.322	24.340	1.084

Disentangle table

Potential mediator (Z-variable)	Coefficient	SE	Percentage difference	Percentage reduced
CEE effect (ref. Western Europe)				
Birth cohort (ref. <1975)				
1975+	-0.000	0.004	-0.040	-0.030
Educational level (ref. lower)				
Higher education	0.197	0.039	40.780	30.270
Partnership status (ref. single)				
Having a partner	-0.102	0.100	-21.180	-15.720
Missing values	0.218	0.103	45.070	33.450
Age at migration (ref. 15-19)				
20-24 years	-0.044	0.022	-9.170	-6.800
25-29 years	0.107	0.051	22.090	16.400
30+ years	0.108	0.070	22.450	16.660
Non-European effect (ref. Western Europe)				
Birth cohort (ref. <1975)				
1975+	0.003	0.005	1.250	0.300
Educational level (ref. lower)				
Higher education	0.179	0.042	86.030	20.940
Partnership status (ref. single)				
Having a partner	-0.263	0.115	-126.530	-30.790
Missing values	0.187	0.121	90.090	21.930
Age at migration (ref. 15-19)				
20-24 years	-0.034	0.021	-16.340	-3.980
25-29 years	0.102	0.058	49.020	11.930
30+ years	0.034	0.081	16.480	4.010

Source: SOEP v36 (1984-2019), own calculations. Note: This illustration shows the decomposition, summary, and disentangle tables of M4 estimated using the KHB method. Birth cohort, educational level, partnership status, and age at migration are treated as potential mediators (Z-variables) in the effects of the region of origin (key variable) on first childbirth (dependent variable). Linear and quadratic age are defined as control variables (concomitants). Information from these three tables is summarized in Table 10.

Appendix C: Sensitivity analyses

Table C1: Sensitivity analysis if the potential mediator variables are included separately: Discrete-time EHA using logistic regression: AMEs on the predicted probability of having a first childbirth

	Model 2a	Model 2b	Model 2c	Model 3
Birth cohort				
<1975	ref.			
1975+	0.0155***			
	(0.003)			
Educational level				
Lower education		ref.		
Higher education		-0.0282***		
		(0.003)		
Partnership status				
Single			ref.	
Having a partner			0.0670***	
			(0.003)	
Missing values			0.0402***	
			(0.003)	
Age at migration				
15-19 years				ref.
20-24 years				-0.0409**
				(0.014)
25-29 years				-0.0813***
				(0.013)
30+ years				-0.0990***
				(0.014)
Observations	17327	17327	17327	17327

Source: SOEP v36 (1984-2019), own calculations. Note: The dependent variable indicates the risk of having a first childbirth. In this sensitivity analysis, first childbirth is regressed only on birth cohort (M2a), educational level (M2b), partnership status (M2c), or age at migration (M3), controlling for linear and quadratic age. Clustered standard errors are in parentheses. *p<0.05, **p<0.01, ***p<0.001

Interpretation: Results are in line with the main analysis (Table 9): the directions and significances of the separate effects of birth cohort, educational level, partnership status (having a partner), and age at migration do not change the evaluation of H2a-c and H3b.

Table C2: Sensitivity analysis if socio-demographic characteristics are included separately: Mediation analysis using the KHB method based on logit-coefficients: Region of origin on first childbirth. Mediation percentages.

	M2 with only controls	
	CEE effect	Non-European effect
Socio-demographic characteristics		
Birth cohort 1975+ (ref. <1975)	0.19[a]	-1.58[a]
Higher education (ref. lower)	38.86***[a]	21.53***[a]
Partnership status (ref. single)		
Having a partner	-17.55[b]	-35.50*[b]
Missing values	38.86*[b]	26.30[b]

Source: SOEP v36 (1984-2019), own calculations. Note: The dependent variable indicates the risk of having a first childbirth. Western European migrants are the reference category of the CEE and the non-European effect. M2 with only controls shows the separate effects when only birth cohort, educational level, or partnership status was included as a potential mediator, given the age controls. [a]overall indirect effect, [b]disentangled indirect effect. †p<0.10, *p<0.05, **p<0.01, ***p<0.001

Interpretation: The directions and significances of the separate mediation effects of the 1975+ birth cohort, higher education, and having a partner are in line with the same effects in M2 of the main analysis (Table 10). Therefore, the evaluation of H2 is insensitive to the individual inclusion of each socio-demographic characteristic.

Table C3: Sensitivity analysis of different birth cohort variables: Discrete-time EHA using logistic regression: AMEs on the predicted probability of having a first childbirth

	Model 2	Model 2	Model 2
Region of origin			
Western Europe	ref.	ref.	ref.
CEE	0.0091*	0.0093**	0.0093**
	(0.004)	(0.004)	(0.004)
Non-European	0.0278***	0.0275***	0.0278***
	(0.005)	(0.005)	(0.005)
Educational level			
Lower education	ref.	ref.	ref.
Higher education	-0.0303***	-0.0299***	-0.0287***
	(0.003)	(0.003)	(0.003)
Partnership status			
Single	ref.	ref.	ref.
Having a partner	0.0680***	0.0681***	0.0680***
	(0.003)	(0.003)	(0.003)
Missing values	0.0376***	0.0374***	0.0373***
	(0.003)	(0.003)	(0.003)
Birth cohort			
<1980	ref.		
1980+	0.0056		
	(0.003)		
<1985		ref.	
1985+		0.0063	
		(0.004)	
<1990			ref.
1990+			0.0203*
			(0.009)
Observations	17327	17327	17327

Source: SOEP v36 (1984-2019), own calculations. Note: The dependent variable indicates the risk of having a first childbirth. Linear and quadratic age are controlled. Clustered standard errors are in parentheses. * p<0.05, **p<0.01, ***p<0.001

Interpretation: Results are in line with the main analysis (Table 9): the positive and partly significant effects of the three different birth cohort variables do not support H2a.

Table C4: Sensitivity analysis of different birth cohort variables: Mediation analysis using the KHB method based on logit-coefficients: Region of origin on first childbirth. Mediation percentages.

	M2 with only controls	
	CEE effect	Non-European effect
Birth cohort 1980+ (ref. <1980)	2.32	-0.95
Birth cohort 1985+ (ref. <1985)	0.16	-0.36
Birth cohort 1990+ (ref. <1990)	5.67	0.94

Source: SOEP v36 (1984-2019), own calculations. Note: The dependent variable indicates the risk of having a first childbirth. Western European migrants are the reference category of the CEE and the non-European effect. M2 with only controls shows the overall indirect effect when only this birth cohort variable was included as a potential mediator, given the age controls. $^{\dagger}p<0.10$, $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$

Interpretation: Results from this sensitivity analysis are in line with the main analysis (Table 10): birth cohort does not significantly mediate the CEE or non-European effect when 1980, 1985 or 1990 is used as a threshold to distinguish between migrants born in different periods.

Appendix D: Robustness analyses

Table D1: Robustness check for the listwise deletion of individuals with missing partner data: Distributions of potential mediators by region of origin (N=13,842, n=917)

	Western Europe	CEE	Non-European	All regions
Birth cohort				
<1975	18.71%	11.90%	17.17%	14.07%
1975+	81.29%	88.10%	82.83%	85.93%
Educational level				
Lower education	33.09%	63.62%	60.10%	58.23%
Higher education	66.91%	36.38%	39.90%	41.77%
Partnership status				
Single	47.89%	50.01%	57.51%	51.18%
Having a partner	52.11%	49.99%	42.49%	48.82%
Age at migration				
15-19 years	11.51%	18.97%	15.15%	17.01%
20-24 years	21.58%	37.07%	35.35%	34.35%
25-29 years	41.73%	27.59%	30.81%	30.43%
30+ years	25.18%	16.38%	18.69%	18.21%

Source: SOEP v36 (1984-2019), own calculations. Note: All distributions are indicated in column percentages. The distributions of birth cohort, educational level and age at migration refer to person levels, while the distribution of partnership status is based on the level of person-years. According to the one-way ANOVA test, the group differences in partnership status are statistically significant at the 0.1% significance level (p=0.000). The Bonferroni test indicates that the differences in partnership status between CEE and Western European migrants are not statistically significant at the 5% significance level (p=0.201), while differences between non-European and Western European migrants are statistically significant at the 0.1% significance level (p=0.000).

Interpretation: Only non-European migrants are significantly less often in a partnership than Western European migrants. This finding is in line with the main analysis (Table 7).

Table D2: Robustness check for the listwise deletion of individuals with missing partner data: Correlations between first childbirth and potential mediators (N=13,842, n=917)

	First childbirth	Observations
Birth cohort	0.02	13,842
Educational level	-0.14***	13,842
Partnership status	0.76***	13,842
Age at migration	-0.08***	13,842

Source: SOEP v36 (1984-2019), own calculations. Note: Tetrachoric correlations were used to estimate how the binary variables birth cohort (0: <1975, 1: 1975+), educational level (0: lower, 1: higher), or partnership status (0: single, 1: having a partner) are correlated with the binary first childbirth variable (0: no event, 1: event). The association between the (here) continuous age at migration variable and the binary first childbirth variable was estimated using the point-biserial correlation. *p<0.05, **p<0.01, ***p<0.001

Interpretation: The positive and statistically significant correlation between partnership status and first childbirth (ß=0.76***) is identical to the same correlation in the main analysis (ß=0.76***) (Table 8).

Table D3: Robustness check for the listwise deletion of individuals with missing partner data: Discrete-time EHA using logistic regression: AMEs on the predicted probability of having a first childbirth (N=13,842, n=917)

	Model 1	Model 2	Model 3	Model 4
Region of origin				
Western Europe	ref.	ref.	ref.	ref.
CEE	0.0173***	0.0090*	0.0102*	0.0049
	(0.004)	(0.004)	(0.004)	(0.005)
Non-European	0.0282***	0.0278***	0.0303***	0.0264***
	(0.005)	(0.006)	(0.006)	(0.007)
Birth cohort				
<1975		ref.		ref.
1975+		0.0018		-0.0078
		(0.005)		(0.006)
Educational levels				
Lower education		ref.		ref.
Higher education		-0.0329***		-0.0277***
		(0.004)		(0.004)
Partnership status				
Single		ref.		ref.
Having a partner		0.0692***		0.0613***
		(0.003)		(0.003)
Age at migration				
15-19 years			ref.	ref.
20-24 years			-0.0610**	-0.0313**
			(0.019)	(0.011)
25-29 years			-0.1010***	-0.0578***
			(0.018)	(0.012)
30+ years			-0.1194***	-0.0687***
			(0.019)	(0.012)
Observations	13842	13842	13842	13842

Source: SOEP v36 (1984-2019), own calculations. Note: The dependent variable indicates the risk of having a first childbirth. Linear and quadratic age are controlled. Clustered standard errors are in parentheses. *p<0.05, **p<0.01, ***p<0.001

Interpretation: The positive and statistically significant effect of having a partner on first childbirth (ß=0.0692***) in M2 supports H2b and therefore aligns with the main analysis (ß=0.0672***) (Table 9).

Table D4: Robustness check for the listwise deletion of individuals with missing partner data: Mediation analysis using the KHB method based on logit-coefficients: Region of origin on first childbirth. Mediation percentages (N=13,842, n=917)

	CEE effect		Non-European effect	
	M2 and M3	M4	M2 and M3	M4
Socio-demographic characteristics	53.04†[a]		-3.91[a]	
Birth cohort 1975+ (ref. <1975)	0.48[b]	-1.91[b]	0.09[b]	-0.35[b]
Higher education (ref. lower)	43.43***[b]	37.39***[b]	28.15***[b]	23.72***[b]
Having a partner (ref. single)	9.14[b]	8.36[b]	-32.15†[b]	-28.78†[b]
Age at migration (ref. 15-19)	43.93*[a]		12.33[a]	
20-24 years	-16.37*[b]	-11.18*[b]	-8.90*[b]	-7.92†[b]
25-29 years	31.12*[b]	22.48*[b]	15.10[b]	14.21[b]
30+ years	29.18[b]	19.29[b]	6.13[b]	5.28[b]
All mediators		74.43*[a]		6.16[a]

Source: SOEP v36 (1984-2019), own calculations. Note: The dependent variable indicates the risk of having a first childbirth. Western European migrants are the reference category of the CEE and the non-European effect. All models are specified according to Table 3: M2 introduces socio-demographic characteristics as potential mediators, M3 introduces age at migration as a potential mediator, and M4 introduces socio-demographic characteristics and age at migration as potential mediators. In all models, linear age and quadratic age are controlled. [a]overall indirect effect, [b]disentangled indirect effect. †p<0.10, *p<0.05, **p<0.01, ***p<0.001

Interpretation: Results from this robustness analysis slightly deviate from the main analysis (Table 10). Specifically, age at migration between 25 and 29 years does no longer slightly significantly mediate the non-European effect in M3 (p=0.149) and M4 (p=0.152). However, since this variable category remains a significant mediator of the CEE effect in M3 (31.12%*) and M4 (22.48%*), the robustness analysis still partially supports H3a and H4, although this only applies to the CEE effect. It should also be noted that other than in the main analysis (-17.29%), the mediation percentage of having a partner of the CEE effect in M2 turns out to be positive in the robustness analysis (9.14%). However, since this mediation is not statistically significant at the 5% significance level (p=0.612), the robustness analysis still does not support H2 in terms of having a partner (only in terms of higher education).

Table D5: Robustness check for the listwise deletion of individuals who have their first birth in the year of migration: Distribution of first childbirth events by region of origin on the person level (N=16,483, n=1,062)

	First childbirth by age 40		
	No event	Event	Total
Western Europe	77	81	158
	(48.73%)	(51.27%)	(100%)
CEE	257	408	665
	(38.65%)	(61.35%)	(100%)
Non-European	60	179	239
	(25.10%)	(74.90%)	(100%)
Total	394	668	1,062
	(37.10%)	(62.90%)	(100%)

Source: SOEP v36 (1984-2019), own calculations. Note: Row percentages in parentheses. ANOVA: p=0.0000; Bonferroni: CEE vs. Western Europe: p=0.052, non-European vs. Western Europe: p=0.000.

Interpretation: Results from this robustness analysis align with the main analysis (Table 5): a larger share of CEE (61%) or non-European (75%) migrants had a first child by age 40 than Western European migrants (51%). However, it should be noted that, in contrast to the main analysis (p=0.006), the differences between Western European and CEE migrants are only slightly statistically significant (p=0.052).

Table D6: Robustness check for the listwise deletion of individuals who have their first birth in the year of migration: Summary statistics of the age at first childbirth by region of origin on the person level (N=16,483, n=1,062)

	Mean	Diff.	SD	Median	Min	Max	n
Western Europe	30.42		4.96	31	19	40	81
CEE	27.92	-2.50***	4.84	28	17	40	408
Non-European	27.12	-3.30***	5.42	26	18	40	179
Total	28.01		5.10	28	17	40	668

Source: SOEP v36 (1984-2019), own calculations. Note: This analysis refers to mothers only (n=668). ANOVA: p=0.0000; Bonferroni: CEE vs. Western Europe: p=0.000, non-European vs. Western Europe: p=0.000. *p<0.05, **p<0.01, ***p<0.001

Interpretation: Results from this robustness analysis largely align with the main analysis (Table 6): CEE and non-European mothers were, on average, significantly younger at the time of their first birth than Western European mothers. While the difference of -3.30 years in the mean age at first birth between Western European and non-European migrants is almost identical to the main analysis (-3.39 years), it should be noted that the difference between CEE and Western European migrants is reduced by 0.5 years, from -3 years in the main analysis to -2.5 years in this robustness analysis. In other words, the largest increase in the mean age at first birth between the main and robustness analysis can be seen for CEE mothers (+0.54 years = 27.92 - 27.38) than for Western European mothers (+0.04 years = 30.42 – 30.38) or non-European (+0.13 years = 27.12 – 26.99) mothers. This finding is related to the fact that more CEE (9% = (65/730)*100)) than non-European (5% = (13/252)*100) or Western European (2% = (3/161)*100) migrants became a mother and migrated in the same year and were thus excluded in this robustness analysis.

Table D7: Robustness check for the listwise deletion of individuals who have their first birth in the year of migration: Discrete-time EHA using logistic regression: AMEs on the predicted probability of having a first childbirth (N=16,483, n=1,062)

	Model 1	Model 2	Model 3	Model 4
Region of origin				
Western Europe	ref.	ref.	ref.	ref.
CEE	0.0124***	0.0059	0.0071	0.0024
	(0.003)	(0.004)	(0.004)	(0.004)
Non-European	0.0289***	0.0268***	0.0293***	0.0254***
	(0.005)	(0.005)	(0.006)	(0.006)
Birth cohort				
<1975		ref.		ref.
1975+		0.0109**		-0.0029
		(0.004)		(0.005)
Educational level				
Lower education		ref.		ref.
Higher education		-0.0287***		-0.0236***
		(0.003)		(0.004)
Partnership status				
Single		ref.		ref.
Having a partner		0.0612***		0.0567***
		(0.003)		(0.003)
Missing values		0.0356***		0.0307***
		(0.003)		(0.003)
Age at migration				
15-19 years			ref.	ref.
20-24 years			-0.0455**	-0.0281**
			(0.014)	(0.010)
25-29 years			-0.0808***	-0.0553***
			(0.014)	(0.010)
30+ years			-0.0999***	-0.0695***
			(0.014)	(0.011)
Observations	16483	16483	16483	16483

Source: SOEP v36 (1984-2019), own calculations. Note: The dependent variable indicates the risk of having a first childbirth. Linear and quadratic age are controlled. Clustered standard errors are in parentheses. *p<0.05, **p<0.01, ***p<0.001

Interpretation: Results from this robustness analysis align with the main analysis (Table 9). First, the CEE and non-European effects are positive and statistically significant in M1 (supporting H1). Second, in M2, the statistically significant effects of birth cohort, educational level and partnership status on the predicted probability of having a first birth point in the same directions as in the main analysis (rejecting H2a and supporting H2b and H2c). Third, the effects of migration between ages 20-24, 25-29 or 30+ years are negative and statistically significant in M3 (rejecting H3b). However, note that in M1, the CEE (ß=0.0124) and non-European (ß=0.0289) effects are reduced compared to the same CEE (ß=0.0160) and non-European (ß=0.0297) effects in the main analysis. These two reduced coefficients are due to the fact that a larger share of CEE (9%) or non-European (5%) migrants had their first child in the year of the migration than Western European migrants (2%). Also, considering that more CEE (9%) than non-European (5%) migrants were deleted because they became a mother in the same year as their migration, this reduction is stronger for the CEE effect (-23% = ((0.0124-0.0160)/0.0160)*100) than the non-European effect (-3% = ((0.0289-0.0297)/0.0297)*100).

Table D8: Robustness check for the listwise deletion of individuals who have their first birth in the year of migration: Mediation analysis using the KHB method based on logit-coefficients: Region of origin on first childbirth. Mediation percentages (N=16,483, n=1,062)

	CEE effect		Non-European effect	
	M2 and M3	M4	M2 and M3	M4
Socio-demographic characteristics	64.41*[a]		14.89[a]	
Birth cohort 1975+ (ref. <1975)	0.25[b]	-0.06[b]	-1.16[b]	0.27[b]
Higher education (ref. lower)	42.93***[b]	35.39***[b]	25.68***[b]	20.73***[b]
Partnership status (ref. single)				
Having a partner	-21.55[b]	-19.32[b]	-30.60*[b]	-26.87*[b]
Missing values	42.78*[b]	36.78*[b]	20.97[b]	17.66[b]
Age at migration (ref. 15-19)	48.71*[a]		14.19[a]	
20-24 years	-15.18*[b]	-9.76*[b]	-6.38†[b]	-5.15†[b]
25-29 years	31.63*[b]	21.71*[b]	16.08†[b]	13.84†[b]
30+ years	32.26[b]	21.01[b]	4.50[b]	3.67[b]
All mediators		85.75*[a]		24.16[a]

Source: SOEP v36 (1984-2019), own calculations. Note: The dependent variable indicates the risk of having a first childbirth. Western European migrants are the reference category of the CEE and the non-European effect. All models are specified according to Table 3: M2 introduces socio-demographic characteristics as potential mediators, M3 introduces age at migration as a potential mediator, and M4 introduces socio-demographic characteristics and age at migration as potential mediators. In all models, linear age and quadratic age are controlled. [a]overall indirect effect, [b]disentangled indirect effect. †p<0.10, *p<0.05, **p<0.01, ***p<0.001

Interpretation: Results from this robustness analysis align with the main analysis (Table 10). Accordingly, the positive and significant mediation of higher education of the CEE and the non-European effect in M2 partly supports H2. Also, H3a is partially supported since the disentangled mediation percentages of age at migration between 25 and 29 years are positive and (slightly) statistically significant regarding the CEE and non-European effect. As they remain positive and (slightly) significant in M4, there is partial support for H4. However, it should be noted that, especially for the CEE effect, the positive mediation percentages of higher education and migration between ages 25 and 29 years are larger than in the main analysis. For example, higher education significantly mediates 43% of the CEE effect in M2, whereas this mediation was only 35% in the main analysis. In contrast, for the non-European effect, the mediation effect of higher education in M2 is only marginally larger (26%) than in the main analysis (25%).