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Fertility Differences by Type of Residence Permit Among Female Immigrants in Sweden

Erik Carlsson[1,2]

[1]INVEST Research Flagship Centre, University of Turku, Turku, Finland | [2]Department of Sociology, Stockholm University, Stockholm, Sweden

Correspondence: Erik Carlsson (erik.carlsson@utu.fi)

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ABSTRACT

Immigrants' life circumstances both before and after migration are likely to vary considerably by type of residence permit, which may affect fertility behaviour. Yet, the relationship between permit type and fertility is surprisingly underexplored. This study uses Swedish population register data to examine fertility differences by permit type among female immigrants to Sweden. The study also examines variation in fertility patterns within the family migrant category by characteristics of the male partner. The analysis compares how the mean number of children of different groups develops over time, both before and after immigration. The relationship between permit type and fertility is examined separately by geographical origin, to facilitate the disentanglement of permit type and origin effects on immigrant fertility. Results show that the mean number of children is higher among refugees and family migrants than among labour and student migrants. Family migrants experience an increase in fertility tempo shortly after migration, whereas this pattern is less pronounced and often somewhat delayed among labour and student migrants and largely absent among refugees. Among family migrants, women who migrated together with or shortly after their male partner have the highest fertility, whereas family migrants with a Swedish-born partner have lower fertility than other family migrants. This study contributes new knowledge to the understanding of how permit type relates to fertility, by studying fertility differences between more permit categories than earlier studies, by considering time both before and after migration, and by exploring heterogeneity within the family migrant category.

1 | Introduction

As the number of immigrants in Western European destination countries has increased over recent decades, a growing body of research has sought to understand immigrants' fertility patterns. Studies in the field have explored the role of many different factors in shaping immigrant fertility, including country of origin, age at immigration, time since immigration, religious affiliation and religiosity, ethnicity, and characteristics of the destination country (Adserà and Ferrer 2015; Carlsson 2023, 2024; Kulu and González-Ferrer 2014; Kulu et al. 2019). One potential explanatory factor that has received relatively little attention is the immigrant's type of residence permit (hereafter referred to as permit type). A small number of studies have compared the fertility of family migrants to that of labour migrants (Impicciatore et al. 2020; Mussino and Strozza 2012a, 2012b; Tønnessen and Wilson 2023) or with independent and first movers (Ortensi 2015). Even fewer studies have compared refugees to other permit categories (cf. Krakhmalova and Kloc-Nowak this issue; Tønnessen and Wilson 2023).

The scarcity of research on the relationship between permit type and fertility is surprising given its potential to explain heterogeneity in both fertility quantum and tempo among immigrants. It is reasonable to expect that life circumstances both before and after migration vary considerably between immigrants with different permit types, such as labour migrants, student migrants, family migrants, and refugees. Permit type is likely to be associated with many characteristics that relate to childbearing behaviour, including partnership status, labour market attachment, educational attainment, settlement patterns in the destination country, value orientation, and ethnicity. Moreover, regulatory differences between permit types, such as permit length, possibilities for family reunification, and access to welfare services, may also contribute to fertility differences between immigrants with different permit types.

In addition to enhancing our understanding of immigrant fertility behaviour, exploring the relationship between permit type and fertility can improve predictions of future immigrant fertility. On 31 December 2021, 35% of all valid residence permits in the EU were issued for family reasons, 20% for labour market reasons, 15% for asylum, 4% for education, and 26% in a residual 'other' category (Eurostat 2024). However, the composition of permit types may shift between immigrant cohorts due to changes in push and pull factors, such as immigration policies at destination, economic conditions at origin and destination, and conflict levels at origin (Erman 2022). Analysing how fertility patterns differ by permit type within recent immigrant cohorts can contribute to better predictions of fertility behaviour in later immigrant cohorts with a new permit-type composition.

This study uses Swedish population register data to explore three research questions. First, how do fertility patterns vary between female labour migrants, student migrants, refugees, and family migrants? The study focuses on women who arrived in Sweden as adults (20–34 years) in relatively recent immigrant cohorts (arrival years 2011–2016). The second and third research questions examine variation in fertility patterns within the group of female family migrants by two characteristics of their male partner: (2) his duration of residence in Sweden before the female family migrant's immigration and (3) his permit type. Although family migrants constitute a large and heterogeneous immigrant group, there is little earlier research on fertility differences within the family migrant category (cf. Wolf 2016).

The analytical strategy is descriptive and consists of comparing time trends in the mean number of children before and after immigration to Sweden among migrants with different permit categories. Patterns are presented graphically to show developments over time in both fertility quantum and tempo. The approach builds on Tønnessen and Wilson (2023) and Wilson (2020). Retrospective information on childbearing before migration is derived from birth dates of children brought to Sweden. Reconstructing fertility histories before migration enables us to (1) identify how positive and negative short-term tempo effects related to the migration event vary by permit type and (2) examine how individuals with different fertility histories are differentially selected into different permit categories.

In all steps of the analysis, the relationship between permit type and fertility is analysed separately by geographical origin and age at immigration. Previous research has shown that fertility patterns vary considerably between immigrants from different geographical origins (Adserà and Ferrer 2015; Andersson 2004; Kulu and González-Ferrer 2014; Kulu et al. 2019). Given the strong correlation between permit type and geographical origin, stratifying the immigrant population by origin facilitates the disentanglement of permit-type and origin effects on fertility. The setup also permits an assessment of whether the association between permit type and fertility varies by origin and age at immigration. Analysing the association between permit type and fertility separately by geographical origin represents an important contribution of the present study, since earlier research on the relationship between permit type and fertility has either overlooked geographical origin entirely or only treated it as a control variable among others (Impicciatore et al. 2020; Mussino and Strozza 2012a, 2012b; Ortensi 2015; Tønnessen and Wilson 2023).

This paper does not consider immigrants who have entered and reside in Sweden illegally. The number of irregular immigrants in Sweden has been roughly estimated to be in the tens of thousands (Hellgren 2024), corresponding to a few percent of the country's total immigrant population (Statistics Sweden 2023). The role of legal status in shaping immigrant fertility has been examined elsewhere (Molinari et al. 2024).

2 | Theory and Earlier Research

2.1 | Earlier Research on the Association Between Permit Type and Fertility

Few earlier studies have taken time both before and after migration into account when analysing how immigrant fertility varies between different permit type categories. Tønnessen and Wilson (2023) compared how the mean number of children ever born varied between refugees, labour migrants, and family migrants who immigrated to Norway at age 20 or 25 in 1975–1989. Labour migrants were often childless at immigration and followed a fertility trajectory similar to that of natives, although those arriving at 25 tended to have lower completed fertility than native women. Family migrants had more children at arrival than labour migrants, experienced an increased fertility tempo shortly after migration, and had higher completed fertility than both natives and labour migrants. Refugees arrived with more children than both labour and family migrants, did not experience a post-migration increase in fertility tempo, yet still had higher completed fertility than both family and labour migrants as well as natives.

Impicciatore et al. (2020) compared first-birth transition rates of family and labour migrants in Italy. Both groups had higher transition rates after migration than before, but this pattern was more pronounced among family migrants, among whom transition rates were particularly elevated during the first 4 years after migration.

Other studies of the Italian context that compared family migrants to either labour migrants (Mussino and Strozza 2012a, 2012b) or independent migrants and first-moving migrants (Ortensi 2015) have also shown that family migrants tend to have higher

fertility than other immigrants. Consistent with Tønnessen and Wilson (2023) and Impicciatore et al. (2020), the two studies by Mussino and Strozza (2012a, 2012b), as well as another Norway-based study (Tønnessen and Mussino 2020), found that family migrants' fertility tends to be particularly elevated shortly after immigration.

2.2 | Possible Explanations for Fertility Differences Between Permit Type Categories

An important explanation for fertility differences across permit categories probably lies in the relationship between permit type and labour market attachment. Student and labour migrants may be motivated by income generation or career ambitions in the destination country. Therefore, they may tend to prioritise education and work over family formation, at least during the initial period after immigration, before they are established in the labour market. This tendency may be particularly pronounced if labour and student migrants' residence permits are temporary and the prospects of renewal depend on the level of performance in the studies or work.

There are also reasons to expect relatively low fertility among student and labour migrants before immigration. Most student migrants immigrate for university-level studies. The tendency for higher-educated women to postpone childbearing is well-documented (Ní Bhrolcháin and Beaujouan 2012). Similarly, individuals who migrate for work purposes may tend to have a relatively strong career orientation, a trait that has also been linked to fertility postponement (Lesthaege 2010).

By contrast, refugees and family migrants who arrive as adults lack an obvious connection to education or the labour market. In the Netherlands and Sweden, both refugees and family migrants have lower labour market participation than labour migrants. While the gap is widest among recent immigrants, it persists even among those with more than 10 years of stay in the destination country (Bakker et al. 2017; Bevelander 2016). Refugees' and family migrants' lower labour market participation frees up time and energy that can be directed to childbearing, especially in the period immediately following immigration.

An additional reason to expect family migrants to have relatively high fertility after immigration, especially in the period directly following immigration, is that the great majority of adult family migrants move to or with a partner. Since most children are born to couples, a higher prevalence of well-established partnerships among family migrants should be associated with higher fertility. For family migrants who experience partner separation before migration, fertility tempo may be low before migration and high after migration due to recuperation of previously postponed childbearing. Furthermore, family migrants may differ from other migrants in their value orientation, with stronger preferences for traditional gender roles and childbearing.

Regarding refugees, there are some additional reasons to expect both high and low fertility behaviour. First, fertility trajectories may be disrupted around the migration event due to stress from conflict, persecution, or forced displacement. Second, refugees may more often than other immigrants belong to minority groups whose fertility behaviour may differ from that of the majority population at origin, for example, Kurds in the Middle East (Yavuz 2006) or Kosovo Albanians in the Balkans (Drezgić 2010). Such origin-context ethnic fertility differentials may persist in the destination country (Carlsson 2023), which may contribute to fertility differences between immigrants with different permit types.

It is important to note that an immigrant's official permit category does not necessarily match their reason(s) for migration. Individuals may choose permit type based on perceived ease of entry into the destination country, rather than the one that best reflects their actual reasons for migration. Survey data from the Netherlands, Norway, Portugal, and the United Kingdom show that the officially recorded permit type corresponds to the self-reported most important reason for migration for 58%–70% of labour, student, and family migrants. When given the opportunity to choose multiple important reasons for migration, almost 90% of the survey respondents mentioned the reason for migration that corresponds to their official permit (Carling 2024).

2.3 | Variation in Fertility Behaviour Within the Family Migrant Category

There are several reasons to expect fertility behaviour to vary within the family migrant category. First, many of the arguments for why fertility differences can be expected between immigrants with different permit types discussed in Section 2.2 apply to both male and female immigrants. Thus, it is reasonable to expect that female family migrants with a male refugee partner tend to have higher fertility than female family migrants with a male labour or student migrant partner.

Second, fertility patterns of female family migrants may vary according to their male sponsor's duration of residence in the destination country before they joined him. Sponsors with a longer duration of residence may be more integrated into the destination society, potentially adopting fertility norms and behaviours more closely aligned with natives. However, sponsors with a longer duration of residence may also have better economic and housing conditions and therefore more resources available for family formation, which could have a positive effect on fertility.

Third, the increase in fertility tempo shortly after immigration commonly observed among family migrants may be more pronounced in cases where the woman migrates to join a partner in the destination country, compared to couples who migrate simultaneously. Temporally separate migration of the family migrant and sponsor implies either that a new partnership is formed or that separated partners are reunited. Both scenarios should mean that the risk of childbearing is higher after than before migration. In contrast, the migration event may have a smaller impact on the fertility trajectory of family migrants who immigrate simultaneously as the sponsor, since such couples are at higher risk of childbirth before migration. Wolf (2016) compared women moving from Turkey to Germany either for marriage migration or family reunification purposes and showed that only the marriage migrants had elevated fertility shortly after immigration.

3 | Immigration and Residence Permits in Sweden

Sweden has had large-scale immigration since the mid-20th century. In December 2022, 20.4% of the Swedish population were foreign-born, one of the highest shares within the OECD (OECD 2022; Statistics Sweden 2023). Immigration to Sweden has been diverse in terms of both geographical origins and reasons for migration. The 10 most common countries of birth for women immigrating in 2011–2016 (i.e., the population examined in this study) were Syria, Somalia, Poland, Iraq, Eritrea, Thailand, Finland, Afghanistan, China, and Iran (Statistics Sweden 2024d). Fertility patterns among immigrants in Sweden vary considerably by geographical origin, with Somalia and much of the Middle East among the high-fertility origins and Eastern Europe and Iran among the low-fertility origins (Andersson 2004).

Among the different types of residence permit an immigrant to Sweden can receive, four main categories can be distinguished: labour migrants, student migrants, refugees, and family migrants. Citizens and permanent residents of EU/EEA countries and their family members do not require a residence permit when moving to Sweden and are therefore excluded from the analyses of this study.

3.1 | Labour Migrants

During 2011–2016, 89,000 individuals immigrated to Sweden from non-EU/EEA countries for labour market reasons (Swedish Migration Agency 2021), corresponding to 0.9% of Sweden's 2011 population of 9.5 million (Statistics Sweden 2024e). A labour migrant residence permit can last for an initial maximum of 2 years, which can then be extended by an additional 2 years, after which the immigrant can apply for permanent residency.

Most labour migrants stay in Sweden temporarily. About half of the labour migrants who entered Sweden during 2011–2016 remained at the end of 2017 (Statistics Sweden 2020). A quarter of the remaining labour migrants were women, among whom the most common origin countries were China, India, and Iran. Among men, the most common origin countries were India, China, and Turkey. Occupations varied considerably by origin. Among both male and female labour migrants from India, about 50% worked in the IT sector. Whereas 40% of male Chinese labour migrants were cooks or similar, the most common occupation for female Chinese labour migrants was engineering. Among female Iranian labour migrants, the most common occupation type was nursing and personal care (Statistics Sweden 2020).

3.2 | Student Migrants

During 2011–2016, 52,000 individuals immigrated as students to Sweden from non-EU/EEA countries (Swedish Migration Agency 2021), corresponding to 0.5% of Sweden's population in 2011 (Statistics Sweden 2024e). The student migrants were either university students at bachelor or master level (84%), PhD students (10%), or students at nonuniversity institutions (6%) (Swedish Migration Agency 2021).

Similar to labour migrants, most student migrants stay in Sweden temporarily. 31% of international students who received a bachelor- or master-level degree at a Swedish university during the 2014/2015 academic year remained in Sweden in 2016 (Bengtsson et al. 2019). Student migrants arriving in 2011–2016 had a roughly even gender distribution (Statistics Sweden 2018; Swedish Migration Agency 2021) and the most common citizenships were China, India, the United States, Pakistan, and Iran (Swedish Migration Agency 2021).

3.3 | Family Migrants

Two hundred forty thousand family migrants arrived in Sweden during 2011–2016 (excluding adoptees and family of EU and EEA citizens and residents) (Swedish Migration Agency 2021). This figure corresponds to 2.5% of Sweden's population in 2011 (Statistics Sweden 2024e). A family migrant is an individual whose residence permit in Sweden is based on a family relationship either to a native or immigrant who already lives in Sweden or to a labour or student migrant who immigrates simultaneously as the family migrant. Simultaneous immigration of a family migrant and their sponsor can only occur when the sponsor has a labour or student permit. Family of refugees are classified as refugees if the family immigrates simultaneously but as family migrants if the refugee immigrates first and reunites with the family later.

The great majority of family migrants are either the sponsor's child or partner, but may also be a parent to a sponsor below 18 years or (only in exceptional cases) another type of family member. The female family migrants whose fertility is analysed in this study are almost always immigrating as partners, given the focus on women who were 20–34 years at immigration. Individuals can immigrate to Sweden as a partner if they are either married, a registered partner, or a cohabiter with a sponsor in Sweden or can show that they have an established, serious relationship with a sponsor and plan to get married, become a registered partner, or cohabit with that person.

There are so-called maintenance requirements for family migration stipulating that a sponsor must have enough means to support the family migrant(s). The maintenance requirements were toughened in 2016, which has made it more difficult for sponsors with low socioeconomic status to (re)unite with their families. Whereas some exemptions to the stricter regulations were maintained for refugees, the socioeconomic composition of partners arriving after the new regulations may differ from that of partners arriving earlier, which could affect fertility behaviour.

3.4 | Refugees

During 2011–2016, 203,000 individuals were granted residence permits as refugees in Sweden (Swedish Migration Agency 2021),

corresponding to 2.1% of Sweden's population in 2011 (Statistics Sweden 2024e). Among individuals receiving refugee permits in 2011–2016, 62% were male and the most common citizenships were Syrian, Eritrean, stateless (primarily Palestinians residing in Syria), Afghan, and Somali (Swedish Migration Agency 2021).

Sweden tightened its regulations on refugee immigration in late 2015 and 2016, making most types of refugee permits temporary instead of permanent, removing some of the grounds for receiving refugee status, strengthening border controls, and restricting the possibilities for family reunification for first-moving migrants. These regulatory changes may have led to compositional differences between refugee cohorts arriving before and after the reforms, which could affect fertility patterns. The reduced possibilities for family reunification among first-moving refugees arriving after the reforms may also contribute to lower fertility among more recent refugee cohorts.

4 | Research Design

4.1 | Data and Analytical Strategy

This study uses Swedish population register data, which contain individual-level information on the full population of interest. The study's analytical strategy is descriptive, showing how the mean number of children developed over time for different groups of immigrant women. The study examines childbearing trajectories after immigration to Sweden, while also constructing retrospective childbearing histories before immigration based on the birth dates of children brought to Sweden. Results are displayed in graphical format, with time before/after immigration on the X-axis and the mean number of children on the Y-axis.

Step I of the analysis distinguishes between four permit categories: labour migrants, student migrants, refugees, and family migrants. Individuals are observed from 5 years before immigration to 5 years after immigration. The study population includes 60,509 women who immigrated during 2011–2016, were aged 20–34 years at immigration, and did not emigrate within the first 5 years after immigration. Inclusion in the study population is restricted to immigrants who arrived in 2011 or later because a quality improvement in the registration of permit types in 2011 makes it easier to distinguish between groups from this year onwards. Inclusion in the study population is restricted to immigrants who arrived in 2016 or earlier since all immigrants are followed for 5 years after immigration and the available data stretch until 2021. Omitting migrants who stayed in Sweden for less than 5 years from the study population is reasonable since the fertility behaviour of temporary migrants is of limited importance to the destination country's long-term demographic development. Approximately 1% of individuals in the relevant ages at immigration are excluded from the study population because they do not easily fit into one of the four permit categories. Women registered with multiple permit types are categorised according to the earliest registered permit.

Step II of the analysis resembles step I but extends the observation period, which now lasts from 5 years before immigration to 10 years after immigration. Only immigrants who did not emigrate within the first 10 years in Sweden are included. Since the available data reach until 2021, the study population is limited to women who immigrated in 2011 and comprises 6600 individuals aged 20–34 years at immigration.

Steps III and IV of the analysis only includes female family migrants and distinguish among them by characteristics of the male partner: by the number of years that the male partner's immigration preceded that of the female family migrant (step III) and by the permit type of the female family migrant's male partner (step IV). For both steps III and IV, individuals are observed from 5 years before immigration to 5 years after immigration. The male partner is identified as the family migrant's spouse or cohabiting partner at the end of the year of her immigration. Cohabiters are identified according to Statistics Sweden's method for detecting cohabiters in population register data (Statistics Sweden 2024b). The study populations of steps III and IV include both individuals who separated from the partner at immigration before the end of observation and individuals who remained with the same partner until the end of observation. Only family migrants in heterosexual unions are included in the study populations of steps III and IV.

For Step III, the study population numbers 27,379 individuals and includes women who immigrated during 2011–2016, were 20–34 years at immigration, and did not emigrate within the first 5 years after immigration.

Step IV is limited to family migrants born in the Middle East (except Israel and Iran). This was the only origin group with a high enough number of individuals and large enough variation in terms of the partner's permit type to make intra-group comparisons possible. Since this study only considers data on permit types from 2011 onwards, family migrants whose partner immigrated before 2011 are excluded from the analysis. Findings from step III of the analysis show that the partner's time in Sweden before the family migrant's immigration is an important factor to consider when analysing fertility patterns among female family migrants. To ensure comparability across immigration years, the study population is therefore limited to family migrants who immigrated during 2013–2016 and whose partner at immigration was either Swedish-born or had immigrated 2 years or less before the family migrant. The study population for step IV consists of 4381 individuals.

At all steps of the analysis, combinations of geographical origin, age at immigration and either permit type (steps I and II), partner's time since immigration (step III), or partner's permit type (step IV) with fewer than 20 individuals are omitted.

4.2 | Variables

An individual's number of children at different ages is calculated from children who can be observed in Swedish population registers, that is, children who have ever lived in Sweden. Children who died before immigration or were never brought to Sweden are not counted, meaning the register-based estimate is lower than the actual number of children ever born for some women. This error is likely negligible for most origin groups but may be substantial for immigrants from origins with high child mortality, such as Sub-Saharan Africa and Afghanistan.

To reduce bias due to left-behind children, the study population is restricted to women who were younger than 35 years at immigration at all steps of the analysis. Women 35 years or older may have adult or near-adult children who are more likely to be left behind in case of international migration. A similar 35-year cutoff has been used in earlier research (Andersson 2004; Carlsson 2023). Moreover, the present study only includes women who stay in Sweden for at least 5 years. Long-term migrants should be less likely than temporary migrants to leave children behind. A 2009 survey from Statistics Sweden showed that more than 98% of female immigrants aged 20–40 reside with all their children, suggesting that immigrating without all children is uncommon for women in this age range (Mussino et al. 2018). Since men may be more likely than women to immigrate without all of their children, male immigrants are excluded as index persons in the present study.

The age-at-immigration variable has three categories: '20–24 years', '25–29 years', and '30–34 years'. The year and month of immigration are determined based on the immigrant's registration date in Sweden.

The categorisation of immigrants' geographical origin is based on their country of birth. The categories are as follows: 'Non-EU Eastern Europe (except Kosovo)', 'Middle East (except Israel and Iran)', 'Iran', 'South Asia', 'East Asia', 'Southeast Asia', 'Somalia', 'Eritrea', 'Afghanistan', and 'Sub-Saharan Africa (except Somalia and Eritrea)'. These categories are based on cultural proximity within groups and the size of different immigrant communities in Sweden. Kosovo is excluded from the non-EU Eastern Europe category because its fertility was considerably higher than that of most other Eastern European countries until relatively recently. Iran is separated from the other Middle Eastern countries because it is one of Sweden's most common immigrant origins while earlier research has shown that Iranian-origin immigrants in Sweden tend to have lower fertility than other immigrant groups of Middle Eastern origin (Andersson 2004). Israel is excluded because it is culturally and socioeconomically different from the rest of the Middle East. Somalia and Eritrea are separated from the rest of the Sub-Saharan African countries because they are two of the most common origin countries of immigrants in Sweden and because refugees and family of refugees dominate immigration from these two countries to a greater extent than the rest of Sub-Saharan Africa. Afghanistan is categorised separately for similar reasons but also because it has higher fertility than its neighbouring countries. For a full list of the countries of birth included in each geographical origin category, see Table A1.

The variable measuring the partner's permit type includes the four permit categories described earlier, as well as the additional category 'Swedish-born', for family migrants who move to a Swedish-born partner. The variable measuring the male partner's duration of residence in Sweden before the female family migrant's immigration has four categories: 'joint immigration', 'partner immigrated 1–4 years before the family migrant', 'partner immigrated 5 or more years before the family migrant', and 'Swedish-born'. Immigration is considered to occur jointly if the family migrant and her partner immigrate in the same calendar year or if the partner immigrates less than 1 year before the family migrant. It seems reasonable that a small time-difference in the registered immigration date of two partners should, in most cases, reflect a joint migratory project.

See Tables A2a–A2d for descriptive statistics of the study populations for each of the four analytical steps.

5 | Results

The results section presents the relationship between permit type and fertility through a series of graphs. The following should be considered when interpreting the graphs. First, there is large variation in the number of individuals represented by each line. Tables A2a–A2d report the number of individuals in each combination of the different variables. Groups with fewer than 20 individuals are omitted. Second, the Y-axis range varies between geographical origin groups, reflecting differences in fertility quantum. Third, it is important to note that the analytical setup is not intended to explain fertility patterns several years before migration by the permit type at immigration. Rather, the purposes of considering fertility behaviour before migration are to understand how (1) premigration fertility histories and (2) short-term tempo effects related to the migration event vary by permit type.

Research question 1 is addressed in Sections 5.1 and 5.2, while research questions 2 and 3 are addressed in Sections 5.3 and 5.4, respectively.

5.1 | Fertility by Permit Type Until 5 Years After Immigration

Figure 1a–c show how the mean number of children among female immigrants who arrived in Sweden in 2011–2016 with different permit types developed over time, from 5 years before immigration to 5 years after immigration. Overall, patterns are in line with expectations and previous research: refugees and family migrants tend to have relatively high fertility, while labour and student migrants tend to have relatively low fertility.

There are pronounced differences between permit categories in how the mean number of children develops over time. Labour, student, and family migrants tend to arrive with few children, especially those who immigrate at ages 20–24 or 25–29. In all cases, family migrants experience a marked increase in fertility tempo directly after immigration. Often, this tempo increase continues until the end of observation but levels off to some extent after the initial years in Sweden. The post-migration tempo increase is more pronounced among family migrants who arrive at younger ages.

In many cases, labour and student migrants also experience an increase in fertility tempo after immigration, although this increase is often less pronounced and may be somewhat delayed compared to family migrants. Labour and student migrants receive temporary permits during their initial period in Sweden, which may lead them to postpone childbearing until they are more established in the destination country.

Refugees stand out from other permit categories with a high fertility tempo before migration which remains largely constant after migration in almost all cases. Thus, the disruptive nature

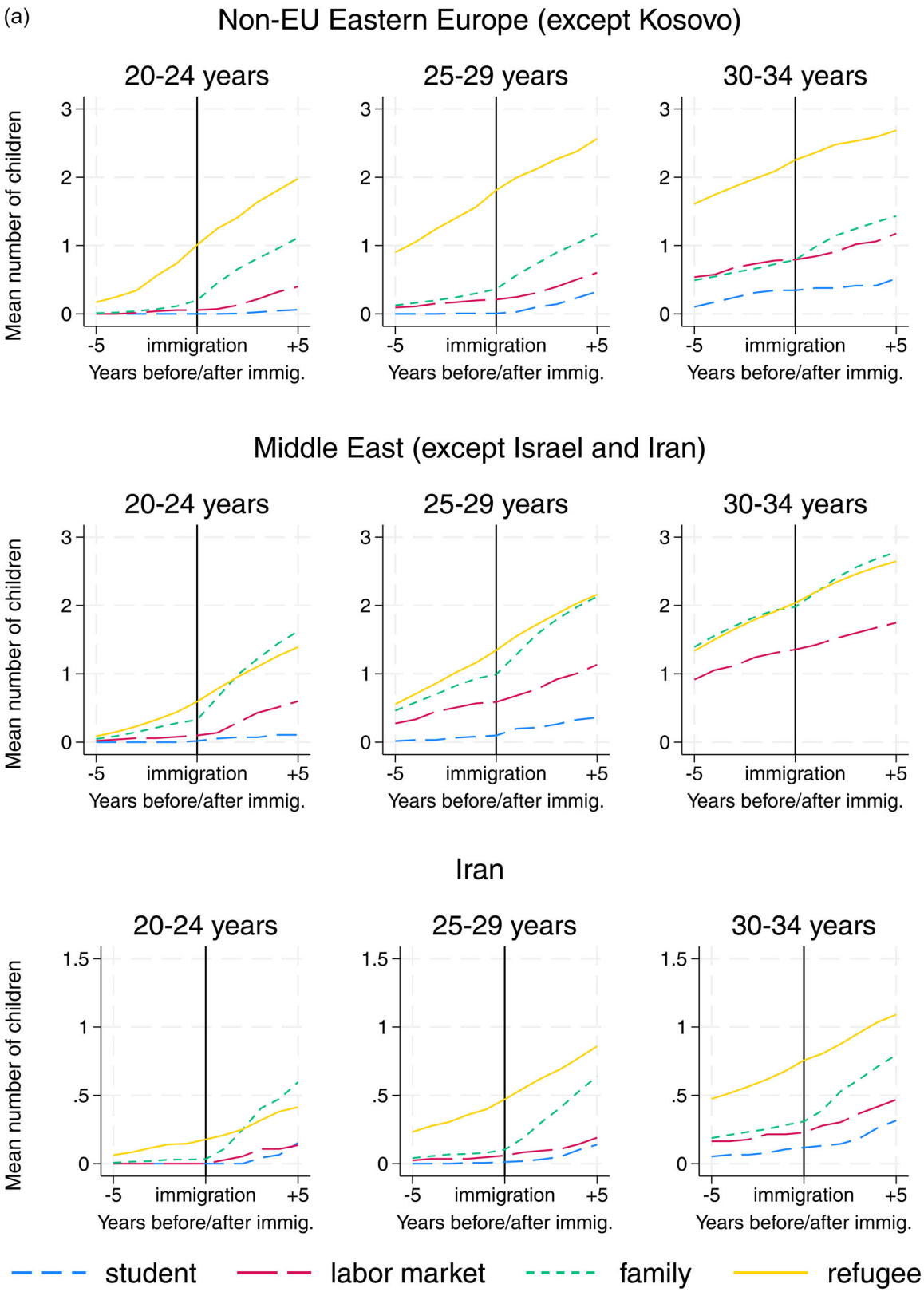

FIGURE 1 | (a–c) Mean number of children by time since immigration, geographical origin, age at immigration, and permit type (women immigrating 2011–2016).

of refugee migration does not lead to a negative short-term effect on fertility. A high share of female refugees in Sweden arrive together with their partner, likely contributing to their stable fertility tempo. Another factor that may contribute to the absence of tempo disruption after immigration is the fact that, during the observation period, refugees in Sweden were primarily granted permanent residence permits. This may have had a pronatal effect by reducing uncertainty.

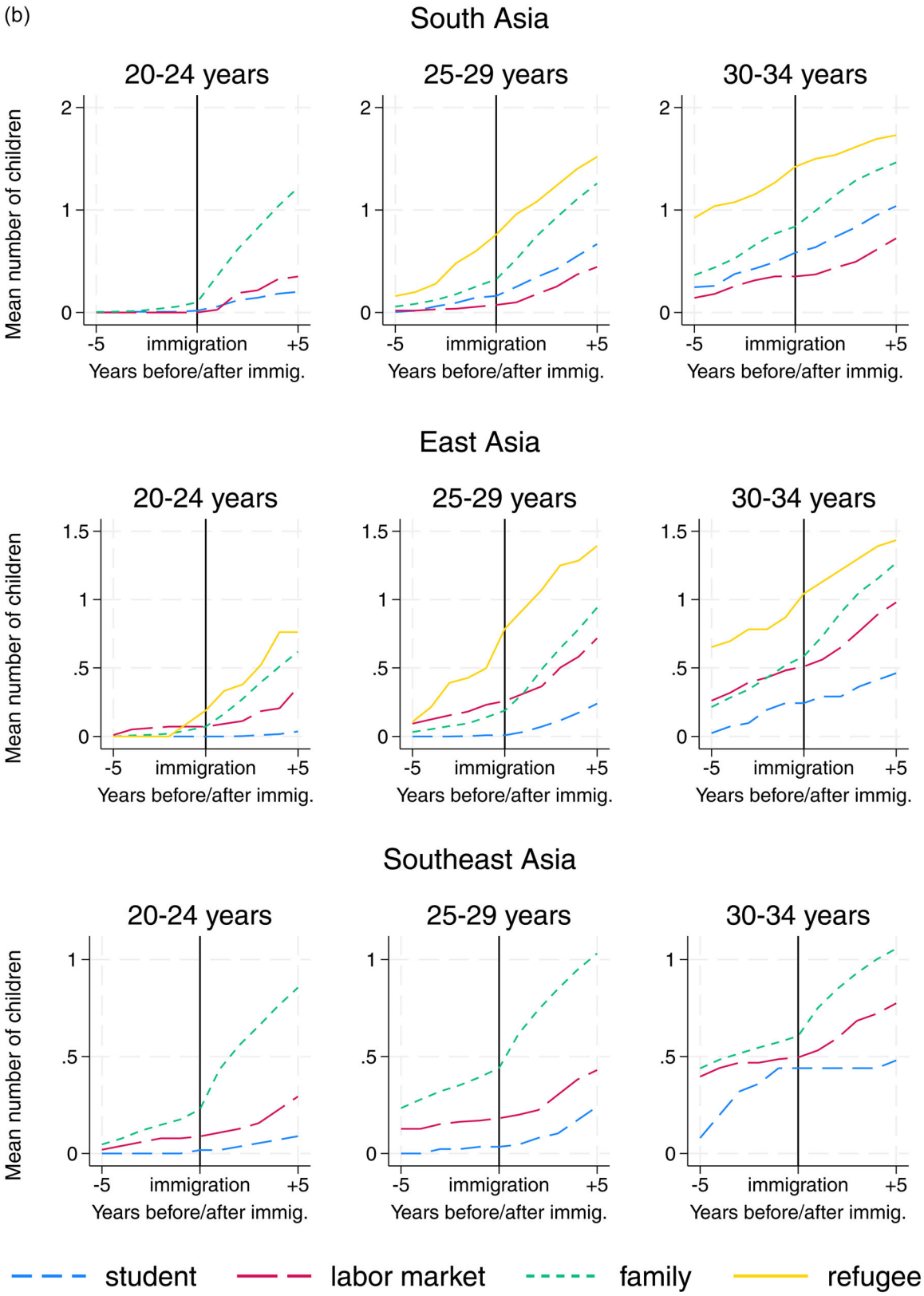

FIGURE 1 | (Continued)

At the end of the observation period, that is, 5 years after immigration, refugees and family migrants have a higher mean number of children than labour and student migrants in all cases. Whether refugees or family migrants have the highest mean number of children 5 years after immigration varies between origin groups. In origin groups where nonfamily migrants are predominantly refugees, such as Somalia, Eritrea, Afghanistan, and the Middle East (except Israel and Iran), family migrants tend to have a similar or higher mean number of children than refugees. Within other origin groups, where

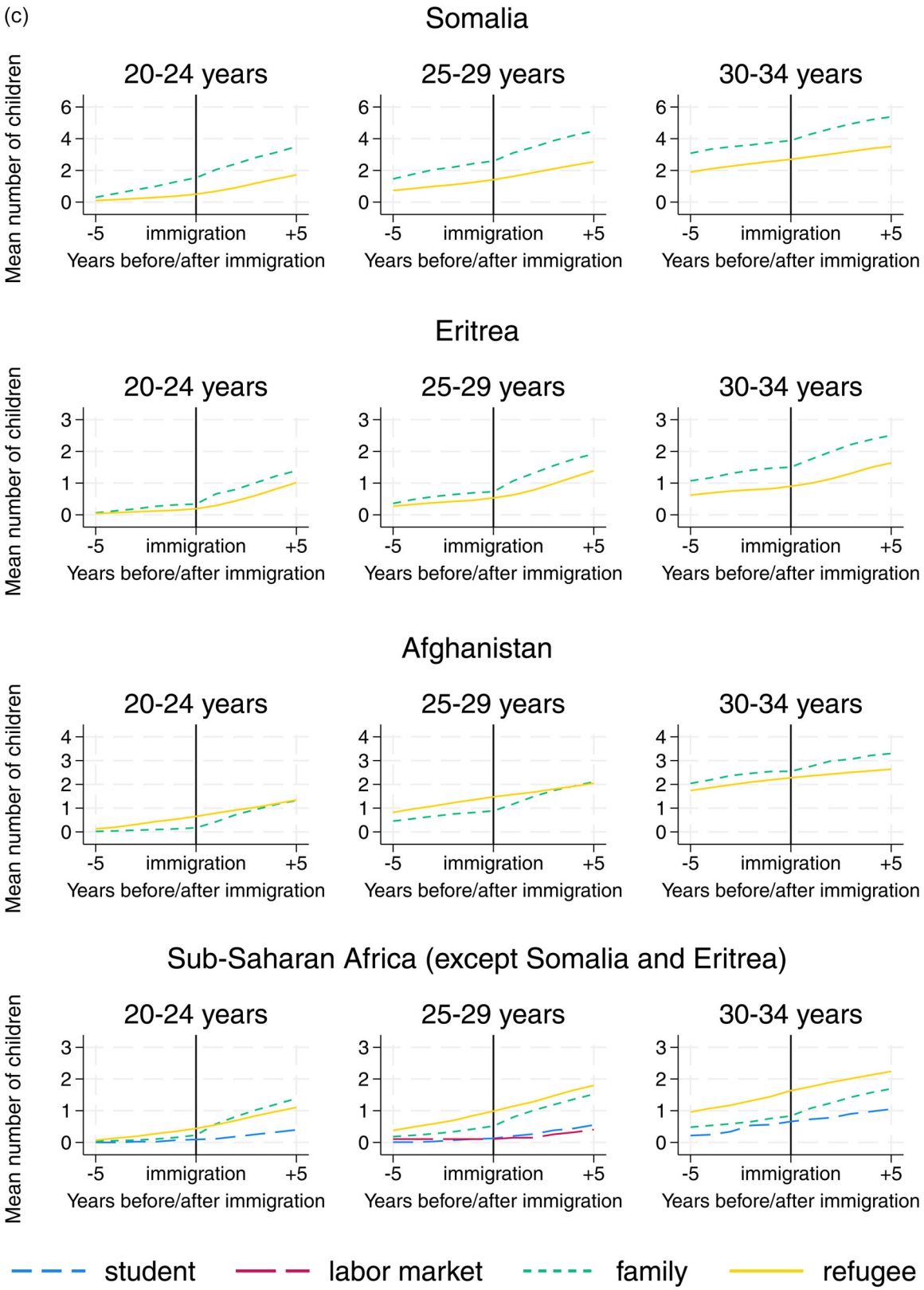

FIGURE 1 | (Continued)

labour and student migrants make up a larger share, refugees tend to have more children than family migrants. This pattern probably reflects compositional differences in the partners of family migrants: the partner is more likely to be a refugee in the former group of countries while he is more likely to be a labour or student migrant in the latter group of countries. Given the higher fertility of refugees compared to labour and student migrants, it is reasonable to assume that fertility is also higher among family of refugees than among family of labour and student migrants (see Section 5.4 for further analysis).

Many patterns—such as high fertility among refugees and family migrants, low fertility among labour and student migrants, and differences between permit types in the development of fertility tempo over time—are relatively similar across origin groups and ages at immigration. Notably, these similarities exist despite substantial intergroup variation in both fertility quantum and the distribution of individuals across the different permit types.

5.2 | Fertility by Permit Type Until 10 Years After Immigration

Step 2 of the analysis examines how the mean number of children of different permit categories develops over a longer period than in analytical step 1. Extending the observation period from 5 to 10 years after immigration allows us to examine whether trends observed in the previous section continue beyond the initial 5 years in Sweden. Figure 2 shows patterns among three origin groups: women born in Eastern Europe (except Kosovo), East Asia, and Southeast Asia. These origin groups were selected because they contain sufficient numbers of individuals to enable comparisons between at least one of the two high-fertility permit categories (i.e., refugees and family migrants) with at least one of the two low-fertility permit categories (i.e., labour and student migrants) in all three age-at-immigration categories. Results for the other seven origin groups are available in Appendix Figure 1a, b. However, in these appendix figures, the labour and student migrant categories are often omitted due to small cell sizes.

Results show that labour migrants do not tend to increase their fertility tempo after the first 5 years in Sweden. Between 5 and 10 years after migration, labour migrants display a similar or lower fertility tempo compared to the high-fertility permit categories within the same origin group. Thus, there are no cases where labour migrants even partly recover a quantum deficit relative to refugees or family migrants that existed 5 years after migration.

Student migrants often experience an increase in fertility tempo after an initial period of very low fertility after immigration. Yet, in most cases, their fertility tempo remains lower or similar to that of other permit categories, meaning they do not recover the quantum deficit that existed 5 years after immigration. Thus, student migrants remain the permit category with the lowest (sometimes joint-lowest with labour migrants) mean number of children 10 years after immigration.

The high fertility tempo of refugees and family migrants often decreases after the first 5 years in Sweden, although there are cases where refugees' fertility tempo remains relatively unchanged at high levels even after the first 5 years in Sweden.

5.3 | Fertility by the Partner's Time Since Immigration Among Family Migrants

The next step of the analysis examines fertility differences within the family migrant category by the male partner's duration of residence in Sweden before the female family migrant's immigration. Figure 3 shows patterns among three origin groups: non-EU Eastern Europe (except Kosovo), Middle East (except Israel and Iran), and Sub-Saharan Africa (except Somalia and Eritrea). Patterns among the other seven origin groups can be found in Appendix Figure 2a,b.

Results show that family migrants with a Swedish-born partner have lower fertility than other family migrants in all cases where the group is included. Family migrants with a Swedish-born partner tend to have few children at immigration, while their fertility tempo after immigration is lower than or similar to that of other family migrants. Thus, the fertility gap existing at immigration either persists or widens after immigration.

Among family migrants with an immigrant partner, those whose partner immigrated more than 5 years before her tend to have fewer children than family migrants who immigrate either jointly or 1–4 years after their male partner. Thus, the partner's duration of residence in Sweden before the family migrant's immigration is negatively associated with fertility quantum in most cases. Quantum differences by the partner's time since immigration exist already at immigration, while tempo differences after immigration are small. A possible explanation for fertility quantum differences by the partner's time since immigration is that unions with a shorter duration between the male and female partner's immigration may tend to be older than unions with a larger time gap between the partners' immigrations. Older unions are more likely than newer unions to have resulted in childbearing before migration.

Interestingly, the increase in fertility tempo after immigration that is characteristic of family migrants is considerably less pronounced among family migrants who immigrate jointly with their partner compared to family migrants who immigrate to a first-moving or Swedish-born partner. This indicates that the increase in fertility tempo after immigration commonly observed among family migrants is limited to newly formed partnerships and partners who were separated in relation to the migration event and, therefore, 'catch up' the postponed childbearing after reunification.

5.4 | Fertility by the Partner's Permit Type Among Family Migrants

The final step of the analysis examines how fertility patterns vary by the partner's permit type among female family migrants. Figure 4 presents patterns for family migrants from the Middle East (except Israel and Iran) who immigrated to Sweden in 2013–2016, either jointly with the partner, to a partner who had immigrated to Sweden 2 years or less before her, or to a Swedish-born partner. The Middle Eastern origin group was the only origin group with a sufficiently large number of individuals and enough variation in the partner's permit types to allow for meaningful intra-origin comparisons. Sponsors with a family migrant permit represent a small group, consisting, for example, of individuals who arrived as partners but separated from their sponsor or individuals who arrived as parents of children with a Swedish residence permit.

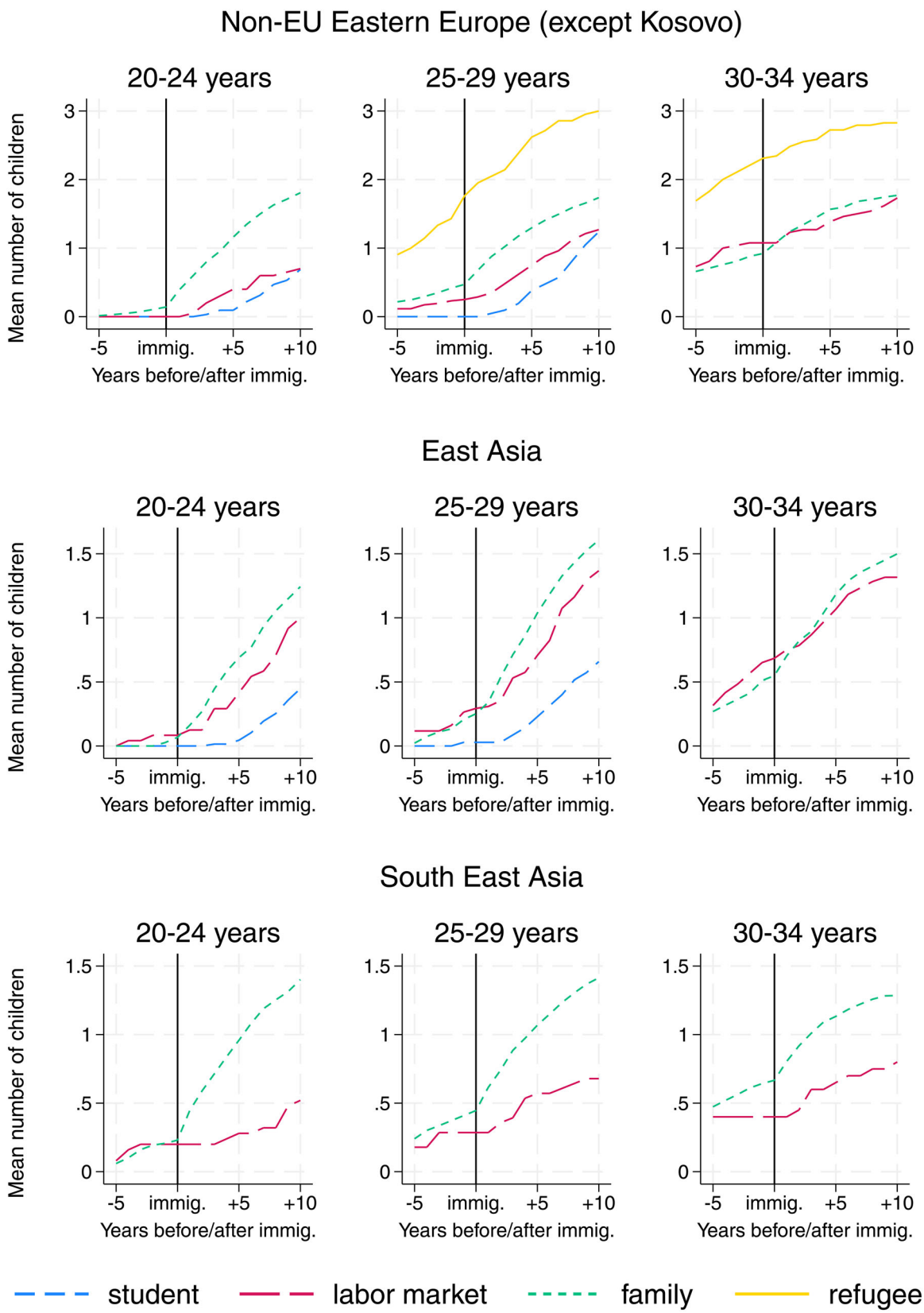

FIGURE 2 | Mean number of children by time since immigration, geographical origin, age at immigration, and permit type (women immigrating in 2011).

Figure 4 shows a clear ordering of categories. Among women who immigrated at ages 25–29 and 30–34, family migrants of other family migrants have the highest mean number of children, followed by family migrants of refugees, family migrants of labour migrants, and family migrants of Swedish-born individuals. While family migrants of other family migrants are omitted among women immigrating at ages 20–24 due to small cell size, the ordering of the three remaining categories is the same as in the

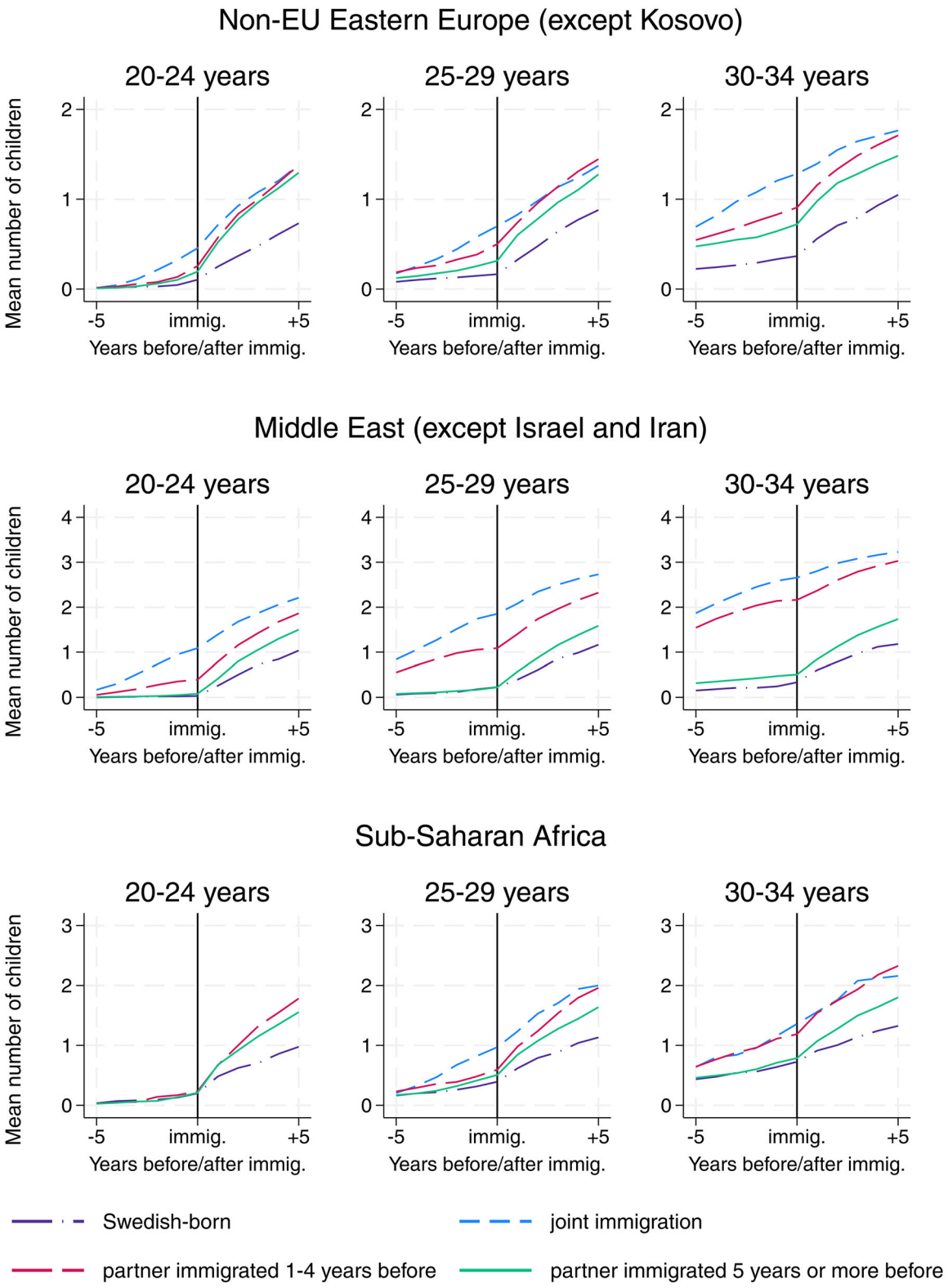

FIGURE 3 | Mean number of children by time since immigration, geographical origin, age at immigration, and the time with which the partner's immigration preceded that of ego's immigration (women immigrating as family migrants 2011–2016).

two older age-at-immigration categories. These differences by the partner's permit type match the findings from Sections 5.1 and 5.2 regarding differences by the immigrant's own permit type.

Among women immigrating at ages 20–24 and 25–29, the gaps between the different family migrant groups are similar at immigration and 5 years after immigration. Thus, family migrants at these ages at immigration display a similar fertility tempo after immigration, regardless of the partner's permit type. Patterns are different for family migrants who immigrate at ages 30–34, among whom those with a refugee partner and especially those with a Swedish-born partner have a higher fertility tempo

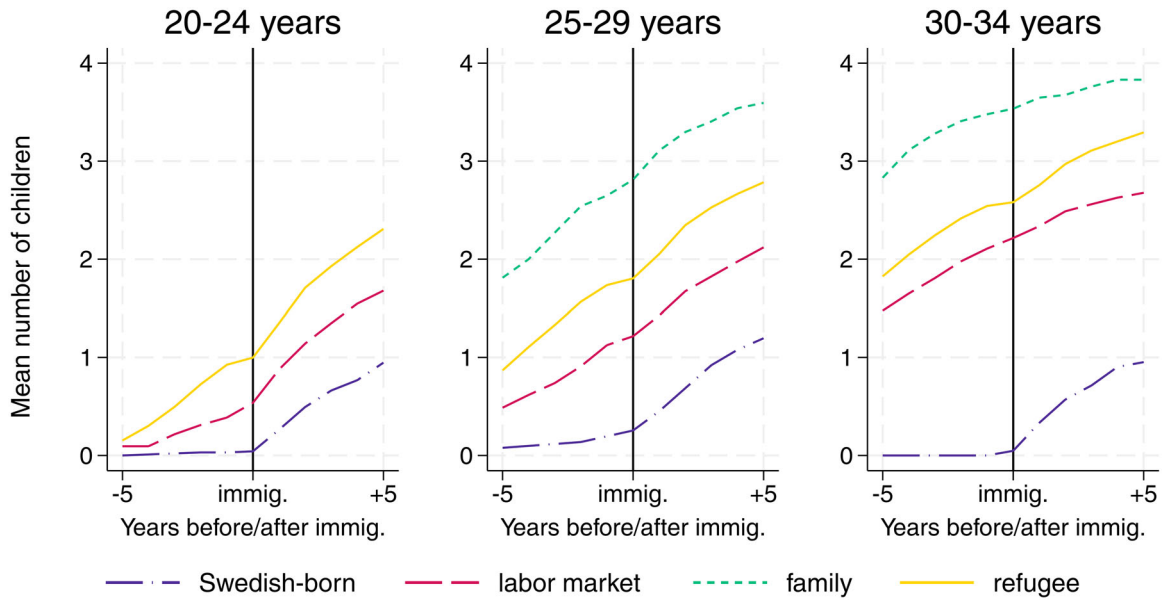

FIGURE 4 | Mean number of children by time since immigration, age at immigration, and partner's permit type (women immigrating as family migrants in 2013–2016 from the Middle East (except Israel and Iran) with a partner or to a partner who had immigrated 2 years or less before her).

than those whose partners were either another family migrant or a labour migrant.

6 | Discussion

This study used population register data to examine the relationship between type of residence permit and fertility among women immigrating to Sweden during 2011–2016. Results show that fertility patterns vary considerably by permit type. Refugees and family migrants tend to have a higher mean number of children than labour and student migrants. Family migrants have a marked increase in fertility tempo directly after immigration. Often, labour and student migrants also experience an increase in fertility tempo after immigration but this increase is weaker than for family migrants and may start some years after immigration. Refugees maintain a high and stable fertility tempo both before and after immigration.

The study also shows considerable heterogeneity in fertility patterns within the family migrant category by characteristics of the male partner. Family migrants who immigrate simultaneously or shortly after their partner tend to have higher fertility than those who immigrate much later than the partner or immigrate to a Swedish-born partner. Moreover, family migrants with another family migrant partner tend to have higher fertility than family migrants with a refugee partner, who in turn have higher fertility than family migrants with a labour migrant partner.

The study makes several important contributions to research on the relationship between permit type and fertility. First, the study uses a stronger research design than earlier studies. By combining prospective data on childbearing after immigration with retrospective estimates of childbearing before immigration, we can explore how two important aspects of immigrant fertility vary by permit type: fertility trajectories before immigration and short-term tempo effects related to the migration event. Few earlier studies on the relationship between permit type and fertility have used longitudinal approaches that incorporate fertility behaviour before immigration (Impicciatore et al. 2020; Tønnessen and Wilson 2023). Moreover, given the strong correlation between permit type and geographical origin, this study's stratification of the immigrant population by origin allows us to disentangle permit-type and origin effects on fertility. Earlier studies on the relationship between permit type and fertility have pooled immigrants with the same permit type, regardless of geographical origin (Impicciatore et al. 2020; Mussino and Strozza 2012a, 2012b; Ortensi 2015; Tønnessen and Wilson 2023).

Second, the study examines more permit categories than previous research. Very few earlier studies have compared fertility patterns of refugees to those of other immigrants (cf. Krakhmalova and Kloc-Nowak this issue; Tønnessen and Wilson 2023), and to my knowledge, no earlier studies have examined fertility patterns among student migrants. Whereas Tønnessen and Wilson (2023) showed that refugees are a high-fertility group with a stable fertility tempo after immigration, the present study shows that refugees' high and stable fertility tempo also applies to the period before migration. There is no evidence that refugees' fertility trajectories are disrupted around migration, meaning there is no support for the hypothesis that stress related to refugee migration should lead to depressed fertility among refugees before and after migration. A third important contribution of the study is that it develops the understanding of heterogeneity within the family migrant category, which has been overlooked in earlier research (cf. Wolf 2016).

The present study is primarily descriptive and does not fully explore the causal chain in the relationship between permit type and fertility. However, labour market attachment, partnership dynamics, and regulatory differences between permit types are likely important mechanisms. First, labour and student migrants arrive for work or educational purposes and may

prioritise those activities over childbearing, particularly in the immediate post-migration period. Refugees and family migrants, on the other hand, may have more time and energy available for family formation, given their weaker labour market attachment (Bakker et al. 2017; Bevelander 2016). Second, since most adult family migrants move to or with a partner, they are more likely than other immigrants to be in a well-established partnership, which likely contributes to their relatively high fertility, especially shortly after immigration. Most female refugees arrive with a male partner, which likely contributes to their high and stable fertility tempo after immigration. Third, the fact that labour and student migrants in Sweden arrive with temporary permits may lead them to postpone childbearing during the initial period after immigration. Refugees, on the other hand, typically received permanent permits during most of the observation period, which may reduce uncertainty and thereby stimulate fertility.

In addition to bringing new insights into the mechanisms shaping immigrant fertility, understanding the relationship between permit type and fertility can help improve predictions of future immigrant fertility. If the composition of permit categories shifts between old and new immigrant cohorts, fertility differences by permit type within recent cohorts can be used to predict fertility patterns within the new cohorts. In Sweden, the total fertility rate (TFR) among foreign-born women has declined more sharply than the TFR among native women in recent years (Statistics Sweden 2024a). One possible explanation may be the declining number of refugees and family of refugees arriving in Sweden since the 2015/2016 policy reforms to refugee and family migration (Statistics Sweden 2024c).

This study's analytical setup, which breaks down the immigrant population into relatively small subgroups, is made possible by the large number of observation units available in population register data. Another important advantage of Swedish population registers is that they cover all immigrants registered in Sweden, whereas non-representativeness of the target population can be a serious issue when using survey data to study international migrants (Font and Méndez 2013). However, there are also advantages associated with survey data. In surveys, immigrants can be asked about their de facto reasons for migration, which may differ from their official permit category. This study shows that both the ordering of permit types in terms of fertility quantum and short-term tempo effects of the migration event are relatively similar across origin groups and ages at immigration. This suggests that controlling for geographical origin and age at immigration in a multivariate regression framework using a pooled immigrant sample would be a reasonable alternative setup if population register data are unavailable.

When generalising this study's findings to other contexts, the following should be considered. First, this study only includes immigrants who stay in Sweden for at least 5 years. Results do not necessarily apply to temporary immigrants, who are likely to differ from long-term immigrants in important respects. Second, regulations relating to different types of residence permit vary over time and between countries. Factors such as permit length, possibilities to (re)unite with family members, and access to welfare services are likely to affect immigrants' fertility patterns.

Some limitations of the study should be mentioned. First, because the analytical setup requires permit types to vary within geographical origin groups, countries from which immigrants do not require a residence permit (i.e., EU/EEA countries) are excluded from the study. Second, since retrospective fertility histories before immigration are estimated based on children brought to Sweden, immigrant groups with a higher probability of migrating without all their children are excluded from the analyses. Specifically, female immigrants aged 35 years or older at immigration and male immigrants regardless of age at immigration are excluded. Third, estimates of fertility histories before immigration for immigrants from countries with high child mortality, such as Sub-Saharan Africa and Afghanistan, may be biased downwards. Fourth, although this study divides immigrants into relatively homogeneous geographical origin groups, permit type may still correlate with national origin within regional groups. Thus, fertility differences attributed to permit type in this study may, to some extent, reflect origin effects. Fifth, Swedish migration regulations were not completely uniform across the observation period. The tightening of refugee and family migration in 2015/2016 may have led to compositional differences between older and newer immigrant cohorts, potentially influencing fertility patterns.

Hoem and Nedoluzhko (2016) have described how analyses of migrant fertility that include pre-immigration time run the risk of anticipatory analysis. The present study compares retrospective birth histories across permit categories without attempting to explain premigration behaviour by the permit type at immigration. Reasonably, the observed associations between permit type and premigration fertility behaviour are explained by other factors, such as educational trajectories, that influence both fertility behaviour and selection into different permit types.

While this study makes several valuable contributions to the understanding of the relationship between an immigrant's permit type and their fertility, the topic remains underexplored. Future research should further examine the mechanisms involved in the association between permit type and fertility. It could be especially interesting to explore how specific regulations relating to the immigrant's residence permit influence fertility, for example by comparing fertility patterns within a specific permit category before and after an important policy change. In-depth analyses of immigrants within a particular permit category (Kraus and Milewski this issue) and qualitative interview-based studies (Krakhmalova and Kloc-Nowak this issue) can also contribute important insights into why permit type and childbearing behaviour are related. Other avenues for future research include exploring the relationship between permit type and fertility among male immigrants and further investigating heterogeneity within the family migrant category.

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Conflicts of Interest

The author declares no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from Statistics Sweden. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from https://www.scb.se/en/services/ordering-data-and-statistics/ordering-microdata/ with the permission of Statistics Sweden.

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Appendix A

TABLE A1 | List of countries included in each of the geographical origin categories.

Origin category	Countries of birth
Non-EU Eastern Europe (except Kosovo)	Albania, Armenia, Azerbaijan, Belarus, Bosnia & Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Russia, Serbia, Soviet Union, Ukraine, Yugoslavia
Middle East (except Israel and Iran)	Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, Yemen
Iran	Iran
South Asia	Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan
East Asia	China (including Hong Kong and Macau), Japan, Mongolia, North Korea, Singapore, South Korea, Taiwan
South East Asia	Brunei, Cambodia, East Timor, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam
Somalia	Somalia
Eritrea	Eritrea
Afghanistan	Afghanistan
Sub-Saharan Africa (except Somalia and Eritrea)	Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic), Congo (Republic), Djibouti, Equatorial Guinea, Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe

TABLE A2a | Distribution of sample across combinations of permit type, geographical origin, and age at immigration (step I of the analysis, observation until 5 years after immigration).

	Age at immigration	Refugee	Family migrant	Labour migrant	Student	n
Non-EU Eastern Europe (except Kosovo)	20–24	6.1	75.2	7.3	11.4	1720
	25–29	6.8	75.8	11.8	5.6	2528
	30–34	11.0	78.2	9.1	1.6	1811
Middle East (except Iran and Israel)	20–24	54.1	43.9	1.3	0.7	7890
	25–29	55.7	41.8	1.8	0.7	8459
	30–34	56.2	41.6	2.3	—	7323
Iran	20–24	35.2	49.4	6.8	8.5	542
	25–29	28.9	49.6	7.4	14.0	1130
	30–34	30.3	54.5	7.8	7.5	1017
South Asia	20–24	—	75.7	2.9	21.5	1294
	25–29	1.2	80.1	7.7	11.1	2116
	30–34	2.3	81.8	9.2	6.8	1140
East Asia	20–24	1.7	33.5	8.0	56.7	1206
	25–29	1.7	59.7	18.2	20.4	1633
	30–34	1.9	69.9	24.7	3.4	1190
Southeast Asia	20–24	—	87.1	8.3	4.6	1228
	25–29	—	87.7	8.1	4.3	2046
	30–34	—	93.9	4.9	1.1	2247
Somalia	20–24	84.7	15.3	—	—	1136
	25–29	64.2	35.8	—	—	1345
	30–34	50.7	49.3	—	—	907
Eritrea	20–24	92.8	7.2	—	—	1838
	25–29	85.1	14.9	—	—	1803
	30–34	82.7	17.3	—	—	1374
Afghanistan	20–24	39.8	60.2	—	—	993
	25–29	60.1	39.9	—	—	702
	30–34	68.9	31.1	—	—	486
Sub-Saharan Africa (except Somalia and Eritrea)	20–24	38.2	56.7	—	5.1	845
	25–29	24.2	65.1	3.4	7.3	1400
	30–34	24.3	71.8	—	3.9	1049

Note: Cells with fewer than 20 individuals are omitted and do not contribute to the combined total number of individuals in the right-most column.

TABLE A2b | Distribution of sample across combinations of permit type, geographical origin, and age at immigration (step II of the analysis, observation until 10 years after immigration).

	Age at immigration	Refugee	Family migrant	Labour migrant	Student	n
Non-EU Eastern Europe (except Kosovo)	20–24	—	80.4	7.5	12.1	265
	25–29	5.1	77.2	12.6	5.1	412
	30–34	11.8	77.6	10.6	—	246
Middle East (except Iran and Israel)	20–24	16.6	83.4	—	—	601
	25–29	17.8	78.0	4.2	—	523
	30–34	24.2	75.8	—	—	343
Iran	20–24	35.4	64.6	—	—	79
	25–29	25.0	48.3	—	26.7	172
	30–34	29.9	70.1	—	—	107
South Asia	20–24	—	100.0	—	—	86
	25–29	—	100.0	—	—	139
	30–34	—	100.0	—	—	83
East Asia	20–24	—	44.8	14.5	40.6	165
	25–29	—	56.7	28.6	14.7	238
	30–34	—	63.4	36.6	—	168
Southeast Asia	20–24	—	89.7	10.3	—	242
	25–29	—	93.6	6.4	—	436
	30–34	—	95.4	4.6	—	434
Somalia	20–24	100.0	—	—	—	280
	25–29	100.0	—	—	—	192
	30–34	100.0	—	—	—	98
Eritrea	20–24	82.1	17.9	—	—	95
	25–29	74.2	25.8	—	—	120
	30–34	78.6	21.4	—	—	98
Afghanistan	20–24	52.3	47.7	—	—	107
	25–29	100.0	—	—	—	64
	30–34	70.6	29.4	—	—	68
Sub-Saharan Africa (except Somalia and Eritrea)	20–24	45.2	54.8	—	—	126
	25–29	22.2	77.8	—	—	185
	30–34	21.5	78.5	—	—	135

Note: Cells with fewer than 20 individuals are omitted and do not contribute to the combined total number of individuals in the right-most column.

TABLE A2c | Distribution of sample across combinations of partner's duration of residence in Sweden before ego's migration, geographical origin, and age at immigration among family migrants immigrating in 2011–2016.

	Age at immi-gration	Joint migration	Partner immigrated 1–4 years before ego	Partner immigrated 5 years or more before ego	Swedish-born	n
Non-EU Eastern Europe (except Kosovo)	20–24	12.6	13.0	52.2	22.2	1078
	25–29	20.7	13.0	42.3	23.9	1633
	30–34	22.5	12.8	42.3	22.4	1190
Middle East (except Iran and Israel)	20–24	17.0	33.6	45.0	4.4	3080
	25–29	31.5	32.4	33.6	2.5	3309
	30–34	42.9	34.1	21.8	1.2	2851
Iran	20–24	—	25.9	64.2	9.9	212
	25–29	15.2	22.7	55.3	6.7	506
	30–34	25.1	13.4	57.1	4.4	501
South Asia	20–24	12.3	36.0	46.2	5.5	927
	25–29	37.3	29.1	30.0	3.6	1635
	30–34	57.9	18.7	23.4	—	879
East Asia	20–24	10.3	10.0	25.2	54.5	301
	25–29	25.6	16.6	17.6	40.2	848
	30–34	36.6	11.1	16.8	35.5	738
Southeast Asia	20–24	3.5	3.8	25.9	66.8	683
	25–29	3.6	3.2	19.6	73.6	1232
	30–34	3.9	2.7	14.4	79.0	1426
Somalia	20–24	—	80.0	20.0	—	135
	25–29	5.7	80.3	14.0	—	437
	30–34	—	90.2	9.8	—	379
Eritrea	20–24	—	62.3	37.7	—	114
	25–29	—	57.6	42.4	—	236
	30–34	—	73.4	26.6	—	199
Afghanistan	20–24	4.9	32.1	63.0	—	548
	25–29	14.1	42.2	43.8	—	256
	30–34	29.1	39.4	31.5	—	127
Sub-Saharan Africa (except Somalia and Eritrea)	20–24	—	27.7	50.0	22.3	382
	25–29	4.4	19.4	51.1	25.2	779
	30–34	3.9	16.7	52.6	26.8	642

Note: Cells with fewer than 20 individuals are omitted and do not contribute to the combined total number of individuals in the right-most column.

TABLE A2d | Distribution of sample across combinations of partner's permit type, geographical origin, and age at immigration (among women immigrating as family migrants in 2013–2016 from the Middle East [except Israel and Iran] with a partner or to a partner who immigrated 2 years or less before her).

Age at immigration	Refugee	Family migrant	Labour migrant	Student	Swedish-born	n
20–24	78.6	—	11.3	—	10.1	940
25–29	81.7	2.4	12.7	—	3.3	1567
30–34	82.9	3.9	12.1	—	1.1	1838

Note: Cells with fewer than 20 individuals are omitted and do not contribute to the combined total number of individuals in the right-most column.

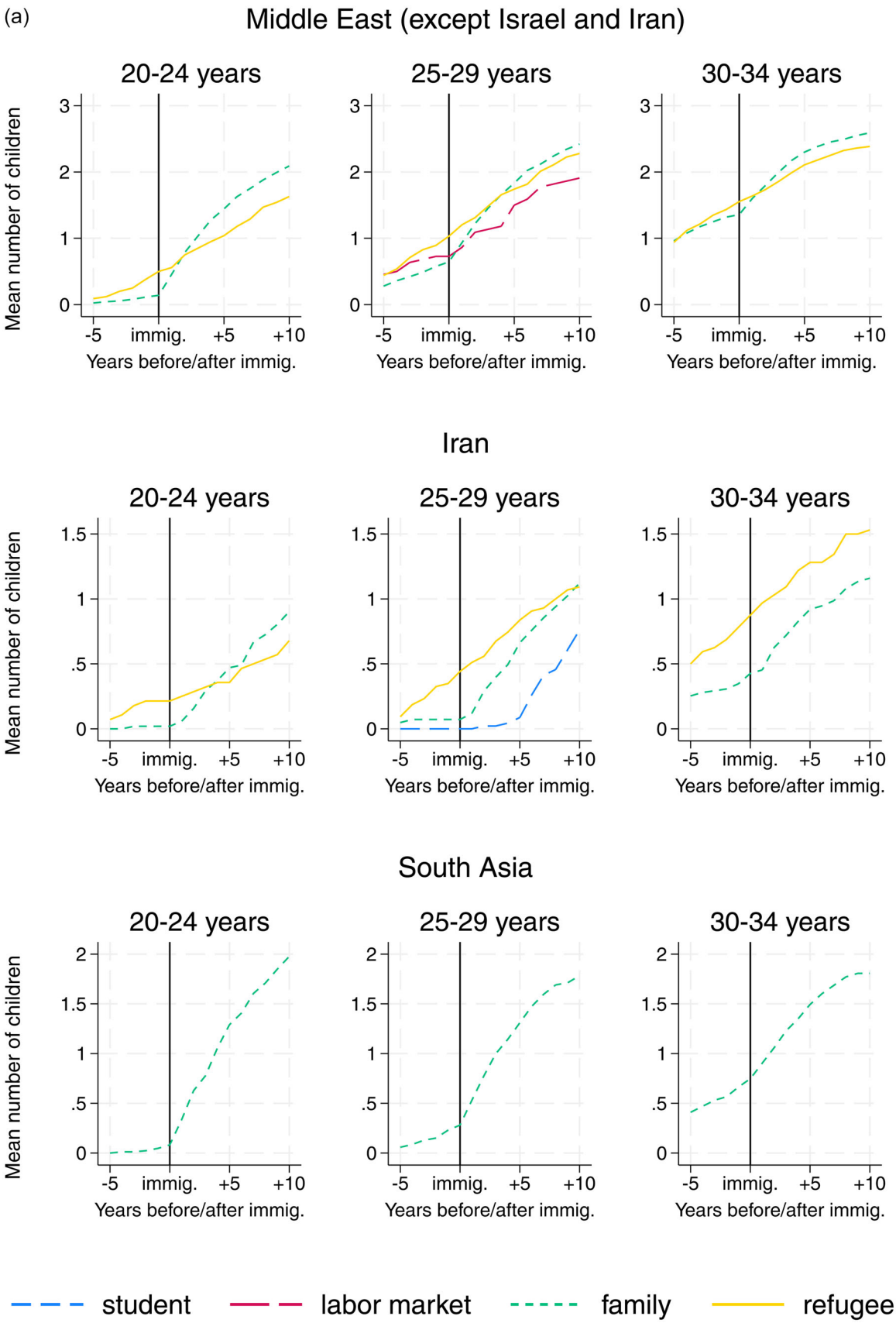

FIGURE A1 | (a, b) Mean number of children by time since immigration, geographical origin, age at immigration, and permit type (women immigrating in 2011).

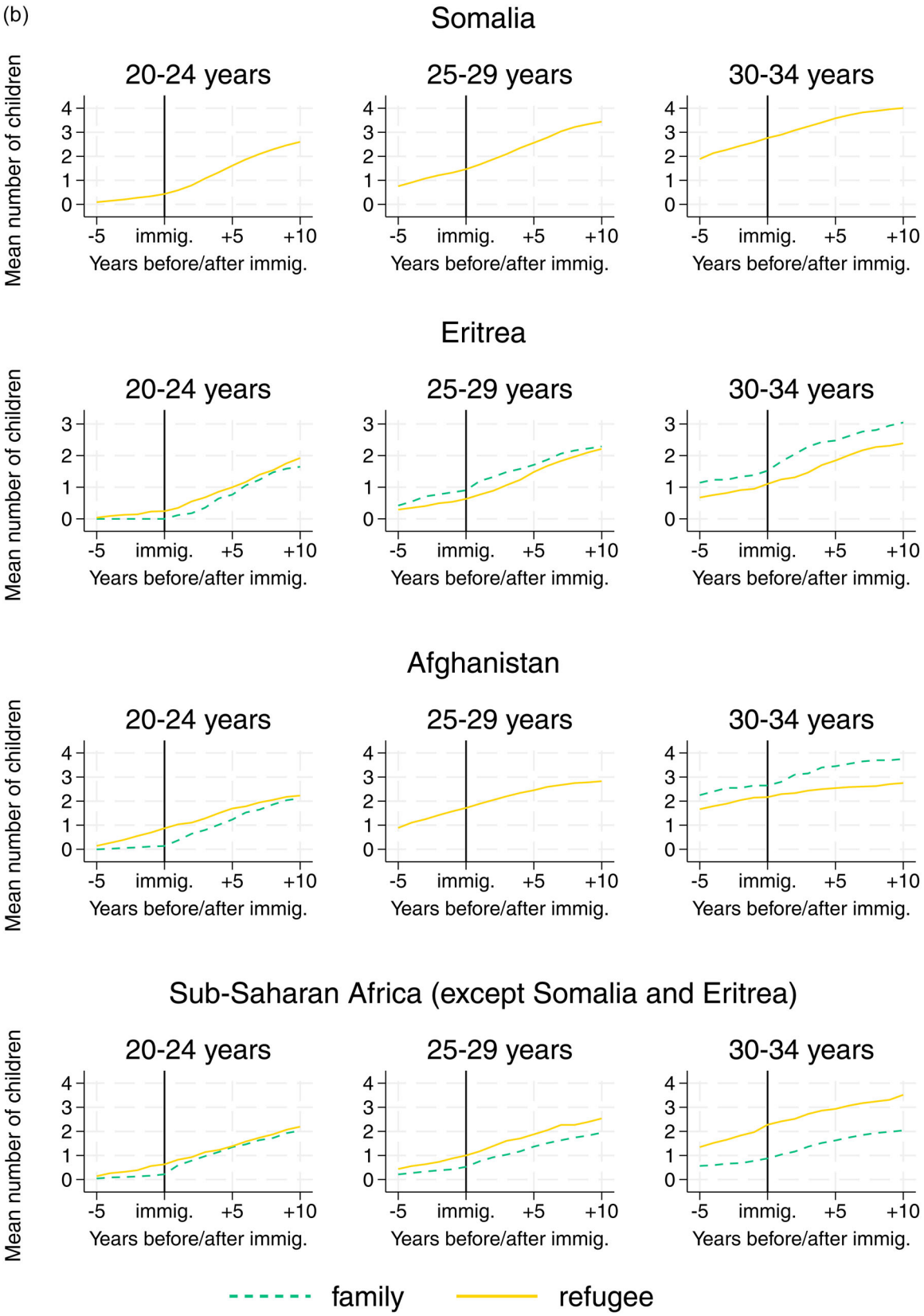

FIGURE A1 | (Continued)

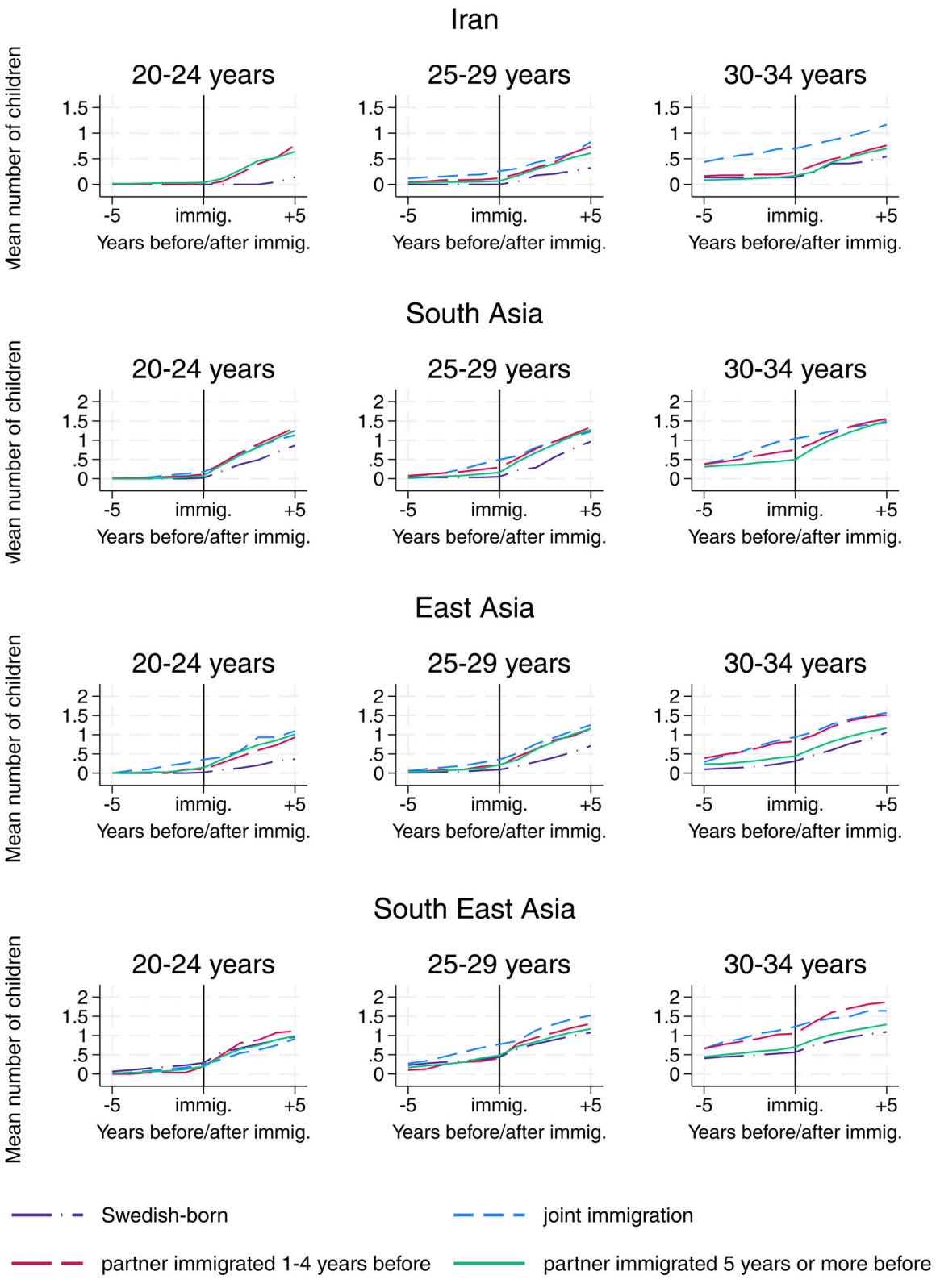

FIGURE A2 | (a, b) Mean number of children by time since immigration, geographical origin, age at immigration, and the time with which the partner's immigration preceded ego's immigration (women immigrating as family migrants 2011–2016).

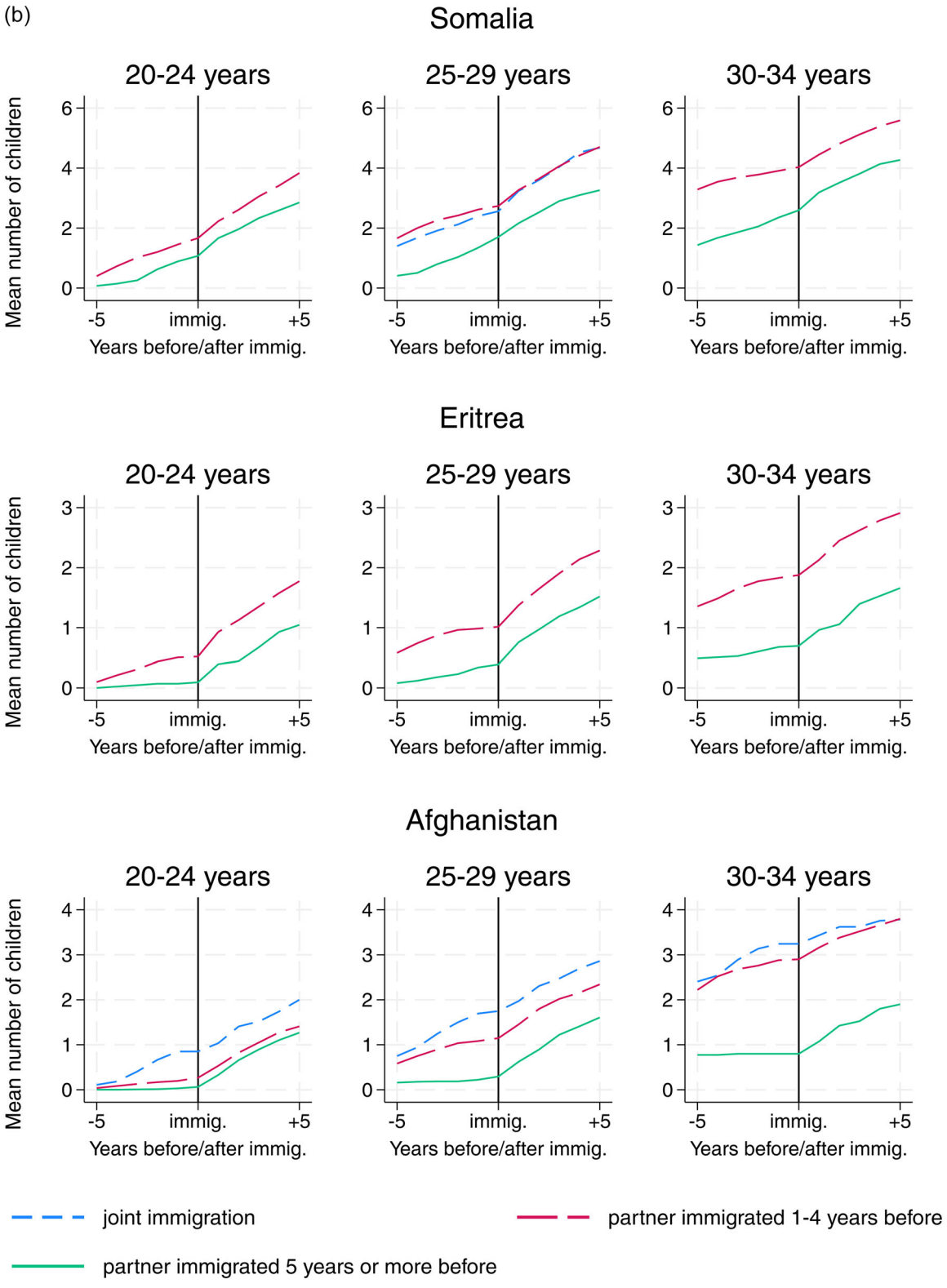

FIGURE A2 | (Continued)