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ETHNIC MIXING IN EARLY CHILDHOOD



VINCENT BOUCHER
SEMIH TUMEN
MICHAEL VLASSOPOULOS
JACKLINE WAHBA
YVES ZENOU

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Ethnic Mixing in Early Childhood*

Vincent Boucher[†], Semih Tumen[‡], Michael Vlassopoulos[§], Jackline Wahba^{**}, Yves Zenou^{††}

Abstract

We study the social integration of ethnic minority children in early childhood. We embed a randomized field experiment in a two-month Turkish preschool program for disadvantaged 5-year-old native Turkish and Syrian refugee children. Within each school, we randomly assigned children to classrooms with a low, medium, or high share of refugees, generating exogenous variation in interethnic exposure. We find that interethnic exposure fosters friendships and improves Syrian children's Turkish language skills, with effects that persist into primary-school grades nine months later. We find no corresponding cost to the academic outcomes of native Turkish children. Our findings show that early-childhood classroom composition can shape integration in ethnically diverse early-education settings.

Résumé

Nous étudions l'intégration sociale des enfants appartenant à des minorités ethniques dès la petite enfance. Nous intégrons une expérience de terrain randomisée à un programme préscolaire de deux mois en Turquie, destiné à des enfants défavorisés de cinq ans, turcs et réfugiés syriens. Au sein de chaque école, nous avons réparti aléatoirement les enfants dans des classes présentant une proportion faible, moyenne ou élevée d'enfants réfugiés, générant ainsi une variation exogène de l'exposition interethnique. Nous constatons que cette exposition favorise la formation d'amitiés interethniques et améliore les compétences en langue turque des enfants syriens, avec des effets qui se prolongent jusque dans leurs résultats scolaires à l'école primaire, neuf mois plus tard. Nous ne constatons aucun effet défavorable correspondant sur les résultats scolaires des enfants turcs. Nos résultats montrent que la

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[†] Université Laval, Department of Economics, Canada. Email: vincent.boucher@ecn.ulaval.ca

[‡] TED University, Department of Economics, Turkey, and Amazon. Email: semih.tumen@tedu.edu.tr

[§] University of Southampton, Department of Economics, UK. Email: m.vlassopoulos@soton.ac.uk

^{**} University of Southampton, Department of Economics, UK, Email: j.wahba@soton.ac.uk

^{††} Monash University, Department of Economics, Australia. Email: yves.zenou@monash.edu

composition des classes dès la petite enfance peut influencer l'intégration dans des milieux d'éducation préscolaire caractérisés par une diversité ethnique.

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1 Introduction

Issues concerning the relations between majority and minority groups—both existing ones and those formed through migration—are important topics of policy debate in many countries. In particular, the social integration of minority groups is increasingly recognized as a critical factor for promoting social cohesion and closing gaps in economic prosperity between groups.¹ A natural question is whether social integration can be promoted by providing opportunities for diverse groups to interact in early-life educational settings? Most of the existing evidence—discussed in more detail below—is based on high school or college students, and mostly in Western countries. There is a dearth of causal evidence on the effectiveness of mixing groups for integration at earlier ages, and limited understanding of the underlying mechanisms at play. This is important for the design of educational policies, as recent studies highlight that interventions in early childhood can not only have lasting effects on the formation of human capital, particularly for disadvantaged children, but can also shape the development of preferences and personality more broadly (Duncan and Magnuson, 2013; Garcia et al., 2023).

In this paper, we advance the literature on the social integration of minority groups by providing causal experimental evidence on the immediate and medium-run impact of mixing 5-year-old children of different ethnic backgrounds in a preschool education setting. We study two core integration outcomes: the formation of interethnic friendships and the acquisition of the host-country language. The context is unique, as it involves both native and refugee children in Turkey, a country that in recent years has been the largest host of refugees, mostly from neighboring Syria.² Three features distinguish our setting from much of the existing evidence on intergroup contact. First, the intervention takes place in early childhood, before peer networks and language skills are fully formed. Second, it studies a refugee-host setting in which integration requires both social interaction and host-country language acquisition. Third, we link the experimental variation in classroom composition to administrative primary-school records, which allows us to examine whether language effects persist beyond the program itself.

Our setting is a two-month early childhood program (Summer Camp) implemented by the Ministry of National Education of the Republic of Turkey (MoNE) during July-August

¹Indeed, a large literature on the economic consequences of social network structure provides ample evidence that group segregation has implications on a wide range of important socioeconomic outcomes, such as educational achievement, employment, health, social mobility, and marriage patterns—see Jackson et al. (2017) for an overview of this literature.

²See <https://www.unhcr.org/data.html> for more detailed data on forced displacement. Figure A1 in Appendix B shows the number of Syrian refugees in Turkey over years.

2019 in 26 provinces.³ The program aimed to (i) bring 5-year-old refugee and native children together for early socio-cultural integration, (ii) familiarize refugee children with the Turkish education system, and (iii) improve the Turkish language skills of refugee children. The program specifically targeted disadvantaged 5-year-old refugee and native children with no earlier access to any form of formal early childhood education.

We embed a randomized field experiment into the rollout of this Summer Camp program in Gaziantep—one of the largest refugee-hosting provinces, located near the Syrian border. In 11 randomly selected public schools, refugee children were randomly assigned to classrooms with differing ethnic composition. This allows us to estimate the causal effect of refugee share in a classroom on two main outcomes: friendship formation for both Syrian and Turkish children and Turkish language acquisition for Syrian children. We collected these outcomes at the beginning of the program and two months later, as the program was coming to an end. This design initiates a “randomized contact” between five-year-old refugee and native children, allowing us to estimate the impact of such random contact on both social and linguistic outcomes.

We find that greater exposure to children of the other ethnicity leads to an increase in the formation of interethnic friendships. In particular, a Turkish child in a class with a low share of refugee children (up to 36%) has a significantly larger share of own-ethnicity friends (85%) than one in a high refugee share group (more than 70%) in which the share of own-ethnicity friends is 38%. The corresponding pattern is smaller for Syrian children: the share of own-ethnicity friends in groups with a high share of refugees is 85%, while in low refugee share groups it is 54%. These patterns are confirmed in regression analysis that controls for various characteristics of the children and their parents, and also includes school fixed effects. We also find a significant improvement in Turkish language skills for Syrian children, with the gains being less pronounced in groups with a higher concentration of Syrian children. Importantly, we also find that exposure to Turkish children during the Summer Camp has a *medium-term* impact on Syrian children’s grades in Turkish language in the following academic year. By contrast, exposure to refugee children has no significant effect on the academic performance of Turkish children.

³As of June 2021, Turkey hosted approximately 1.35 million school-age (5-17) refugee children (see <https://piktes.gov.tr/Home/IndexENG> for statistics and documentation.) Turkey has implemented a range of programs to address the educational disruptions caused by displacement and to integrate the refugee children into the education system. The key lesson from this process is that these programs tend to be more effective when implemented earlier. Differences between the education systems in Syria and Turkey, and, in particular, the difficulty of transitioning from Arabic to Turkish—which have substantially different linguistic structures, and even alphabets—necessitates additional effort at the early childhood level to facilitate social integration. In response, the focus of integration programs has increasingly shifted toward this younger age group.

These results suggest that early-education settings can promote refugee children’s integration when they create sustained opportunities for contact with native peers.

Our paper contributes to several strands of the literature.

First, our analysis is related to the literature on intergroup contact in educational settings (Carrell et al., 2019; Merlino et al., 2019; Rao, 2019; Corno et al., 2022). This line of work draws on the contact hypothesis, which is fundamentally a theory about contact reducing prejudice or bias against a minority group.⁴ Compared to this literature, we do not directly examine whether contact is changing attitudes towards outgroups. Instead, we focus on how randomized exposure to non-coethnics affects key mechanisms directly relevant for socio-cultural integration—such as, interethnic friendship formation and language acquisition—in a mixed educational environment. The fact that contact happens between refugee and native children of age 5 is interesting in its own right given the large wave of forced displacement experienced worldwide in recent years.⁵

Second, our paper contributes to the literature on the assimilation of refugees. Alan et al. (2021, 2023) are earlier studies that examine the issue of ethnic segregation of Syrian refugee children in educational settings in Turkey. Although we share a similar setting, namely studying the issue of social integration of refugee children in Turkey, our focus is different, albeit complementary: whereas those papers evaluate specific interventions or teacher attitudes, we study the causal impact of randomized ethnic mixing in early childhood on integration outcomes.

Finally, we speak to the fast-growing empirical and theoretical literature on the formation of networks.⁶ In line with the literature in sociology (McPherson et al., 2011), most papers find strong evidence of homophily: the salient feature of social networks that, regardless of the context, individuals who have similar characteristics (e.g., ethnicity, race) are more likely to be linked (Currarini et al., 2009, 2010; Boucher, 2015; Mele, 2020; Badev, 2021). Explanations for homophily are generally based on either preference or meeting biases (Bramoullé et al., 2012; Currarini et al., 2009).

A broader literature has focused on the role played by ethnic networks in the economic

⁴The contact hypothesis originates from the seminal work of Allport (1954), who argues that intergroup contact is an effective way to eliminate prejudice under certain conditions (contact theory). The idea has generated a very large literature aiming to test its empirical relevance in various contexts (Pettigrew and Tropp, 2006; Paluck et al., 2019; Siddique et al., 2026). Contact theory maintains that intergroup contact improves relationships between groups under certain circumstances—i.e., when both groups are of equal status or when they have common goals (Lowe, 2021; Mousa, 2020).

⁵Several recent papers examine the broader impact of exposure to refugee migration on the attitudes and preferences of natives, including preferences for redistribution (Dahlberg et al., 2012), political preferences (Dustmann et al., 2019; Steinmayr, 2021), and attitudes toward refugees (Hangartner et al., 2019).

⁶See Jackson (2008), De Paula (2020) and Graham and De Paula (2020) for reviews of the literature on network formation.

integration of refugees (e.g., [Edin et al., 2003](#); [Martén et al., 2019](#)), while others have highlighted the key role played by language in the assimilation and integration of immigrants ([Chiswick and Miller, 1995](#); [Foged et al., 2023, 2024](#)) and refugees ([Fasani et al., 2022](#)).⁷ Yet, to our knowledge, there has been no comprehensive quantitative study of the causal effect of ethnic mixing in early childhood on language acquisition and interethnic friendships, which are significant measures of integration. A recent study ([Tumen et al., 2025](#)) provides support for early language interventions, showing that Turkish language training improved school outcomes and reduced absenteeism among Syrian refugee children. Our paper complements this study by showing that randomized peer exposure can significantly improve language skills and social integration in early childhood.

The paper is organized as follows. Section 2 provides some background information on the case of Syrian refugees in Turkey and their educational integration. Section 3 describes the institutional setting, the experimental design, and the data. Section 4 presents our empirical strategy and results on friendship formation, language acquisition, absenteeism, and medium-term grades, together with robustness and balance checks. Finally, Section 5 concludes.

2 Background

The Syrian civil war caused one of the worst humanitarian crises in recent history generating approximately 7 million refugees, who have been mainly hosted by neighboring countries such as Turkey, Lebanon, and Jordan. The short-term humanitarian response was provided by host countries and other stakeholders. However, refugees are also expected to pose long-term challenges in key policy domains such as labor markets, education, health, and other public services in host countries.⁸ Hosting nearly 4 million Syrian refugees (Figure A1), Turkey has already begun tackling the key social integration issues. Educational integration is a top priority as there are more than 1.35 million Syrian children of school age in Turkey—940 thousand enrolled (36 thousand pre-school, 444 thousand primary school, 349 thousand middle school, 111 thousand high school), and 433 thousand out of school (as of June 2021).

⁷[Brell et al. \(2020\)](#) provide a recent survey on the factors affecting the success of refugees’ economic integration.

⁸A growing literature studies the impact of Syrian refugees on host-country outcomes—e.g., [Tumen \(2016\)](#); [Fallah et al. \(2019\)](#).

2.1 Syrian refugees in Gaziantep

This section discusses the context and provides some background information about Syrian refugees in Gaziantep, where our field experiment took place. Gaziantep is a large Turkish province nearby the Syrian border with a total population of around 2.2 million. Based on the official figures of the Directorate General of Migration Management, the refugee-to-population ratio varied between 0.16 and 0.19 during the 2016-2020 period in Gaziantep.

Gaziantep is a popular refugee destination not only because it is close to the border, but also because it has a vibrant economy and there are historical, cultural, and economic ties between Gaziantep and northern Syria (especially Aleppo), where most refugees originate from. The ethnic composition in northern Syria is quite heterogeneous as it includes people of Arab, Turkmen, and Kurdish origin. A certain degree of ethnic heterogeneity is also observed among natives in Gaziantep; although the vast majority are Turkish, there are also Kurdish residents and a small number of individuals with Arabic origins, particularly in areas close to the Syrian border.

The mother tongue of Syrian refugees is Arabic. Although some inherited and common words/phrases exist, there are significant linguistic differences between Arabic and Turkish languages. Most importantly, the alphabets are substantially different, which makes language acquisition particularly difficult. Language therefore constitutes a key barrier to the socio-economic integration of Syrian refugees.

Most natives and refugees are Sunni Muslims and share similar religious practices. There are some non-Sunni Muslim and non-Muslim refugee groups, but those are minorities. Turkish and Syrian families often live in the same neighborhoods in varying proportions. Residential sorting of Syrian refugees into neighborhoods in Gaziantep is mostly determined by income rather than ethnicity. Table A3 presents summary statistics about the degree of residential mixing in our sample. On average, Syrian refugees earn less than natives and they densely live in neighborhoods where disadvantaged natives also reside.⁹

There has been a strong trade relationship between Gaziantep and Aleppo and the composition of major sectors in both regions overlaps to a large extent—i.e., textiles, footwear, food and agriculture, construction, and tourism. Food and dietary habits are also similar. Although Turkish and Syrian communities in Gaziantep share many cultural similarities, the main challenges to integration stem from linguistic and educational differences rather than

⁹The majority of Syrian men are employed, while most married Syrian women are housewives (Table A3). Employed Syrians mostly have informal jobs, which typically pay significantly less than the minimum wage for unskilled workers (Tumen, 2016). Wealthier Syrians live in rather affluent neighborhoods.

visible or religious distinctions. Therefore, it is hard to claim that living in Gaziantep is a major cultural and socio-economic shock to Syrians. Although Syrian refugees are not social outcasts, being forced out of their home countries, having lost their family members and significant others during the civil war, and being directly exposed to violence are major traumatic events that make integration particularly challenging for them.

2.2 Educational integration

The approach toward educational integration of refugees reached a turning point in early 2016. Up to that point, both the authorities and the refugees believed that the Syrian crisis was temporary and there was no systematic attempt to integrate refugee children into the Turkish education system. By 2016, however, it was acknowledged that educational integration should become a policy priority. In line with this change, the education policy was redesigned to fully integrate Syrian children into the Turkish education system. The integration program contained three major elements: language training, integration into the Turkish education system, and social integration. These elements required substantial investment into educational resources. The EU Facility for Refugees in Turkey (FRIT) provided financial support in two tranches to support the undertaking of vital investments.

Educational integration of refugee children has been a challenging task, especially due to language barriers. The stark differences between Arabic and Turkish languages in terms of linguistic structures, phonetics, and alphabets make Turkish language acquisition particularly difficult for Syrian children. In the Syrian culture, it is common to expose children to certain religion-related Arabic words such as “Allah,” “Muhammad,” and holy phrases such as Takbir, Salawat, and Basmala starting from early ages. There are Quran courses that children enroll and learn reading Quran at pre-school age. Therefore, Syrian children are predisposed to Arabic alphabet, which makes the transition to another alphabet at school age particularly difficult.

Refugee students (especially adolescents) have low school attachment and programs aiming to increase their attachment to school have only had limited effects despite their high cost.¹⁰ There are additional reasons, beside language barriers, that contribute to low school attachment of refugees and keep them out of school. Compulsory education in Syria is 5 years, while it is 12 years in Turkey. Furthermore, refugees have larger families and children with low academic achievement are often expected to contribute to family income and house-

¹⁰See [Tumen et al. \(2019\)](#) for detailed impact assessment of those programs. The report is available from MoNE upon request.

work. Male children tend to drop out to earn labor income, while females drop out to either do housework or get married (as early as at age 12).

In recognition of these issues, MoNE decided to start refugee integration from pre-school age and a pilot study (the Summer Camp) was implemented in 2019. The aims, coverage, and content of this program are explained in the next section.

3 The Preschool Summer Camp, Experimental Design, and Data

Section 3.1 describes the Summer Camp program during which our randomized field experiment was implemented. Section 3.2 presents the details of our experimental design and implementation. Section 3.3 describes the data used in the empirical analysis.

3.1 The Preschool Summer Camp

MoNE implemented a two-month Early Childhood Summer Camp Program in 2019, running from July 1 to August 31. The target population was 5-year-old Turkish and Syrian children, who were to start elementary school in the Fall semester of the 2019-20 academic year. The program was implemented across Turkey in the 26 provinces with the highest concentrations of refugees.¹¹ More than 40,000 children were enrolled in the Summer Camp; of these, slightly fewer than 20,000 were refugees.¹²

The main goals of the program were (i) to provide an accelerated early childhood education for disadvantaged native and refugee children, (ii) to socially integrate native and refugee children, (iii) to formally introduce Turkish language to refugee preschoolers, (iv) to introduce the norms and informal rules of Turkish society to refugee children, and (v) to familiarize refugee children with the Turkish education system. A free lunch and afternoon snacks—which matter for low-income parents—were also provided during the program to encourage the enrollment of disadvantaged children.

The program relied on buildings, teachers, and other facilities of public schools located in the 26 provinces. Since it was implemented during the summer months, there were no physical capacity concerns. The MoNE preschool teachers were assigned to the program on a voluntary basis, and they received extra compensation for their service. Teachers and

¹¹It should be noted that those 26 provinces were selected in collaboration with the EU and the FRIT funds have been primarily channeled into those provinces. A specific project, called the “Project on Promoting Integration of Syrian Kids into the Turkish Education (PIKTES),” was launched and administered by the MoNE. PIKTES carried out a wide range of activities and the Summer Camp was part of those activities.

¹²The program was not designed specifically for Syrian refugees. Based on the inclusiveness principle, refugees from other nationalities—such as Afghanistan, Iran, Iraq, Somalia, and others—were also allowed to enroll; but, as expected, Syrians were the majority, i.e., more than 97%.

school administrators also received a short training during the last week of June about the program’s content, goals, and curriculum.

A specific curriculum was designed by MoNE—not within the context of our experiment—in collaboration with UNICEF and in line with the program’s objectives. The curriculum clearly outlined the activities to be performed on a week-by-week basis. They included regular pre-school skill acquisition activities to improve linguistic, manual, cognitive, and socio-emotional skills of participating children; group activities (such as teamwork and playgroups) to mix children of different genders and ethnicities; activities to teach them the formal rules they should follow in elementary school; and activities to familiarize the refugee children with the informal rules/norms of the Turkish society. Formal Turkish language training was provided jointly to both Syrian and Turkish children.

3.2 Experimental Design

We conduct a medium-scale randomized field experiment, which is implemented as part of the Summer Camp program. The main goal of the experimental design is to randomly allocate refugees to classrooms to obtain a balanced mix of classrooms with high, medium, and low refugee concentration. In the absence of a random allocation, classroom formation would likely be endogenous and estimating the impact of refugee concentration on outcomes of interest would be a complicated issue. The randomized experiment is implemented in Gaziantep, because it has a large refugee population and is a major implementation hub for the Summer Camp program.

After MoNE announced the program, which was advertised in refugee-intensive areas through the outreach activities of MoNE and its partners in the field, refugee and Turkish parents registered their 5-year-old children to designated schools based on their home address. In other words, parents did not directly choose the school, and school selection was made based on catchment area. A total of 4,634 5-year-old children (2,188 refugees and 2,446 natives) were registered to the program in Gaziantep in 121 schools. MoNE shared with us the lists of children registered to the program in each school before the children were assigned into groups. We initially identified 46 schools with around 50% refugee concentration. Then, we randomly selected 11 schools in which we implement our experiment—5 are located in Sehitkamil, 5 in Sahinbey, and 1 in Nizip.¹³ Figure A2 in Appendix B maps the locations of these schools.

In the 11 selected schools, children were randomly assigned to 36 groups before the pro-

¹³All the 11 selected schools agreed to participate.

gram began. To generate variation in the share of refugees across the groups, we first fixed the share of refugees in each group within each school in agreement with the school administration. Then we randomly assigned the children into the groups.¹⁴ The resulting groups varied in size from 10 to 24, with an average size of 16.9. Note that forming Syrian-only or Turkish-only groups was not allowed because the purpose of the program was to mix the two groups. Figure A3 in Appendix B shows the distribution of refugee share across these 36 groups, which suggests a balanced mix of groups with high, medium, and low share of refugees. Appendix Table A10 reports the classroom-level distribution of refugee share and the composition of the low-, medium-, and high-refugee-share terciles. Switching between the assigned classes and/or schools was not allowed in our sample. Note that teachers' assignment to groups was random and occurred before children were randomized into groups.

The main goal of the empirical analysis—see Section 4—is to analyze how refugee intensity in a group affects various outcomes of participating children. One challenge against this goal was that a three-day Eid (Qurban) holiday occurred during the week before the program ended, and this posed a risk of losing students after Eid and, thus, not being able to measure their end-of-program outcomes. To avoid this risk, we collected data three times during the program. The baseline was collected at the beginning of the program. The end-of-program endline was collected twice: before Eid and after Eid. If the student showed up only after Eid or both before and after Eid, then we used data from the third wave as the end-of-program data for the corresponding student. If the student showed up only before Eid, then we used the second wave as the end-of-program data for the corresponding student.

3.3 Data Description

A total of 638 children were in the initial allocation list. Of those, 12 children (5 refugees, 7 natives) did not attend the program, which means that pre-program data collection was performed for 626 children. An additional 4 children dropped out (3 refugees, 1 native) after the second week, and 18 children (8 refugees, 10 natives) did not take the end-of-program assessment—i.e., they were not surveyed in either of the two endline waves. In total, 604 children completed the program—328 refugees and 276 natives, 310 males and 294 females. The attrition rate was only 5%.¹⁵

¹⁴If, for example, there were 51 children, 25 Syrians and 26 Turkish, in a certain school who would be split into three groups of size 17 each (the average group size in our dataset), then we would determine the numbers of Syrian children in each group (say 5, 8, and 12) in agreement with the school administration and then randomly assign the children into the groups. So the refugee shares would be $5/17 = 0.29$, $8/17 = 0.47$, and $12/17 = 0.71$, respectively, in the three groups of this school.

¹⁵Although attrition is very small, we still check whether non-attendees selectively dropped out. We find that the characteristics of the non-attendees are not meaningfully different from those of participating children. We also find

Table A1 in Appendix A presents a comparison of students in our sample with various other groups of students along several observable characteristics (gender, number of siblings, pre-school attendance, parental education, origin in Syria). These characteristics were obtained from administrative data in fall 2019 when the students enrolled in primary school. We provide summary statistics for four distinct groups: (i) children who attended the Summer Camp; (ii) children attending the same schools as those in our sample but not attending the Summer camp program, (iii) children attending schools neighboring our experimental schools, and (iv) all children attending schools in the province. As standardized measures for comparing academic performance across schools are not available for grade 1, in the bottom panel of the Table we also provide some statistics on the educational outcomes of grade 4 students attending these schools, based on a standardized test.

Panel A of the Table shows that students attending the Summer Camp, both Syrian and Turkish, are very similar in these observable characteristics to their co-ethnic counterparts in groups (ii), (iii), and (iv) as defined above. In particular, students who attended the Summer Camp are similar to those attending the same schools who did not attend the Summer Camp, as well as those enrolled in neighboring schools. Since these schools are partly shaped by the program’s eligibility criteria and local targeting, we interpret these local comparisons as evidence on representativeness within the targeted program environment. For assessing broader external validity, the most relevant comparison is with all children attending schools in the province, reported in group (iv). When compared to province-wide averages, it is evident that Summer Camp schools and neighboring schools have slightly less educated parents, suggesting that they stem from families with lower socioeconomic status. This pattern is true for both Syrian and Turkish children. Furthermore, students in grade 4 attending Summer Camp schools are similar in terms of academic performance to other neighboring schools and have slightly lower scores than the province-wide averages. These comparisons suggest that children in our sample are representative of the targeted local environment. In line with the objectives of the program, which aimed to address underprivileged children, our sample appears to be slightly more disadvantaged than other children in the province.

We focus on two main outcomes: (1) friendship networks and (2) Turkish language skills (for Syrian children). We elicited the friendship network of the children twice: in the baseline and the end-of-program assessment exercises conducted by the teachers. Because the end of

no statistically significant association between the share of refugees in a child’s class and their probability of attriting. Basic summary statistics about the characteristics of dropouts are provided in Table A3 in Appendix A.

the program coincided with Eid, some children were surveyed before and some after the Eid. In other words, we elicited each child’s friends twice: once at the beginning and once toward the end (either before or after Eid).¹⁶ Children were asked to report their best friends (up to 5) in the classroom and rank them, and teachers recorded the names.¹⁷ In our analysis, we construct various outcome variables using the friendship network details.

During the Summer Camp, Turkish language training was provided to both Turkish and refugee children. In addition to the language training, the refugee children were exposed to Turkish students in the classroom. The Turkish language skills of the refugee children were assessed by the teachers at the beginning and end of the program on a six-point scale—1- none, 2-can only recognize letters, 3-can identify some words, 4-can bring together a few words to communicate, 5-can form sentences, and 6-can speak fluently.¹⁸

Table 1 presents summary statistics for the main outcomes of interest. In terms of friendships, a few interesting patterns in Table 1 are worth highlighting. First, both Turkish and Syrian children made more friends during the course of the Summer Camp. Second, Syrian children report a slightly greater total number of friends (2.8 vs 2.6; t-test, $p=0.033$) and have a slightly higher share of friends who are their own ethnicity (80% vs 74%; t-test, $p=0.046$) than Turkish children. In reference to language skills, there is a significant improvement (72%) during the course of the Summer Camp. This can also be seen clearly in Figure A4 in Appendix B, which displays the distribution of language skills across the two waves.

Table 1: Summary statistics: Outcome variables (means)

	All sample			Syrian			Turkish		
	[1]	[2]	[Diff]	[1]	[2]	[Diff]	[1]	[2]	[Diff]
Turkish language skills	-	-	-	2.33	4.02	1.69	-	-	-
# of friends	2.40	2.72	0.31	2.51	2.82	0.31	2.27	2.59	0.32
# of Syrian friends	1.42	1.56	0.14	2.02	2.21	0.19	0.70	0.79	0.09
# of Turkish friends	0.98	1.15	0.17	0.49	0.61	0.12	1.57	1.80	0.23
Share of own ethnicity friends	0.68	0.77	0.09	0.71	0.79	0.09	0.65	0.74	0.09
Number of obs.	604			328			276		

Notes: This table reports means of the main outcome variables. [1] indicates baseline; [2] indicates endline; [Diff] indicates the difference between the two. There are 604 children in the sample (328 Syrian, 276 Turkish; 310 male, 294 female).

¹⁶Most of the children (96.7%) were assessed after the Eid. Only 20 children (12 Syrian and 8 Turkish) were assessed before the Eid. There was no imbalance by share of refugees in one’s classroom or ethnicity on the timing of assessment.

¹⁷Observe that the maximum number of friends is not binding, since very few students report 5 friends and the average number of friends is 2.40. See Table 1.

¹⁸In addition, we elicited prosocial behavior of the children through a version of the dictator game, which we call the Sticker Game. Appendix C reports these complementary results.

We also collected background information through a survey of the parents: number of siblings, parental education, and parental employment information for both native and refugee students. Moreover, we collected information on whether the parents resided close to refugees and whether parents’ friends included any refugees. For Syrian parents only, we collected information on their region of origin in Syria, the year of arrival in Turkey, and their Turkish language skill level. Summary statistics for these variables are reported in Tables A3-A6 in Appendix A.

4 Results

We begin by analyzing friendship networks, then turn to language acquisition, and finally examine medium-term educational outcomes using administrative data.

4.1 Empirical Strategy

The main regression equation that we estimate is specified as follows:

$$y_{ig}^2 = \alpha_s + \beta q_g + \boldsymbol{\lambda}_1' \mathbf{x}_{ig} + \boldsymbol{\lambda}_2' \mathbf{z}_{ig}^p + \epsilon_{ig}, \quad (1)$$

where y_{ig}^2 is the outcome of child i in group g measured in the endline and q_g is the share of refugees in group g . The vectors of controls $\mathbf{x}_{ig}$ and $\mathbf{z}_{ig}^p$ include characteristics specific to the children (gender, ethnicity, number of siblings) and their parents (education, employment status, ethnic composition of friends and neighborhood; for Syrian parents, we also control for region of origin in Syria, year of arrival in Turkey, and Turkish language skills), respectively, while α_s is a school fixed effect. Throughout the analysis, we cluster standard errors at the classroom level.

In a standard school setting, the refugee share will likely be correlated with the outcome variable, as students in classrooms with high refugee intensity would be of lower socioeconomic background due to the address-based enrollment system—i.e., neighborhoods with high refugee concentration would mostly consist of residents from lower socioeconomic backgrounds. Moreover, there may be a tendency—due either to the choices of school administrators or pressure from influential parents in the region—to selectively form classrooms. As a result, q_g might be correlated with unobserved determinants, ϵ_{ig} , of the outcome variable. In our setting, (1) both the Syrian and Turkish children in the 11 schools are randomly assigned to 36 classrooms, (2) the randomization is performed so that the refugee intensity also

randomly varies across classrooms, and (3) the children in those classrooms are not allowed to change classrooms during the Summer Camp. Our main parameter of interest is β . This measures the change in y_{ig}^2 in response to a one-percentage-point randomized change in q_g .

To examine possible nonlinear effects of the refugee share on the outcomes of interest, we also estimate a specification of the following form:

$$y_{ig}^2 = \alpha_s + \sum_{q=2}^3 \beta_q t_{qg} + \lambda_1' x_{ig} + \lambda_2' z_{ig}^p + \epsilon_{ig}, \quad (2)$$

where t_{qg} are indicator variables that denote the tercile of the refugee share distribution.¹⁹

In Table A7 of Appendix A, we report a “balancing test” to check whether the share of refugees in one’s class is related to a number of predetermined student characteristics: gender, mother’s and father’s education, number of siblings, mother’s and father’s employment status, ethnic composition of parents’ friends and of neighborhood; and for Syrians, if Aleppo is the region of origin, arrival year, and Turkish language skills of parents. We do so by regressing the characteristics on refugee share, controlling for nationality and school fixed effects. As can be seen in the table, only for mother’s employment is the estimated coefficient marginally statistically significant ($p=0.099$); note though that there is little variation in mother’s employment, as 95.7% of mothers in the sample are not employed (see Table A3). We also report the same balancing tests for each sample (native vs. refugees), separately. We find that the only characteristic that correlates significantly with refugee share, is the number of siblings for Turkish children. We also report in Table A8 balancing analysis across the three categories of classrooms defined by the terciles of the refugee share distribution. All in all, out of the 56 tests reported in the Table, there are significant differences in ten of them (17.8%): three in the Syrian subsample and five in the Turkish subsample. We control for all these characteristics in the regression analysis. Finally, Appendix Table A9 reports additional robustness checks using reweighting, school exclusions, and alternative definitions of the refugee-share terciles. Appendix Table A11 reports leave-one-school-out diagnostics for the main friendship and language outcomes.

Overall, this analysis indicates that, as we might expect due to the randomized formation of classes, student observable characteristics are not systematically related to the ethnic composition of the class.

¹⁹The cutoffs are 38.5% for the first tercile and 70% for the second tercile. See Table A2 in Appendix A for summary statistics of the outcome variables by tercile.

4.2 Friendship Networks

In this section, we examine whether refugee exposure affected friendship formation, focusing on both the number and ethnic composition of friendship links. Table 2 reports results separately for Turkish and Syrian children. For each group, we report effects on the total number of friends, the number of own-ethnicity friends, the number of interethnic friends, and the share of interethnic friends. We present both the linear refugee-share specification and the tercile specification, where the omitted category is the low-refugee-share group.

Table 2: Classroom Composition and Friendship Formation

	Total friends	Own-ethnicity friends	Interethnic friends	Share interethnic friends
<i>Panel A. Turkish children</i>				
<i>Linear refugee-share specification</i>				
Refugee share	0.006 (0.009)	-0.014** (0.007)	0.020*** (0.007)	0.758*** (0.221)
<i>Refugee-share terciles</i>				
Medium refugee share	0.042 (0.368)	-0.472** (0.186)	0.514** (0.240)	22.479*** (7.033)
High refugee share	0.140 (0.682)	-0.800* (0.472)	0.939** (0.428)	27.445** (13.071)
Observations	276	276	276	276
<i>Panel B. Syrian children</i>				
<i>Linear refugee-share specification</i>				
Refugee share	0.005 (0.010)	0.022** (0.009)	-0.017** (0.006)	-0.480** (0.214)
<i>Refugee-share terciles</i>				
Medium refugee share	0.062 (0.318)	0.688** (0.277)	-0.626*** (0.197)	-18.502** (7.433)
High refugee share	-0.278 (0.533)	0.474 (0.403)	-0.752** (0.315)	-21.045** (9.793)
Observations	328	328	328	328

Notes: The table reports effects of classroom refugee share on friendship formation. Each panel reports both the linear classroom refugee-share specification and the tercile specification, with the low-refugee-share tercile omitted. Own-ethnicity friends are Turkish friends for Turkish children and Syrian friends for Syrian children. Interethnic friends are Syrian friends for Turkish children and Turkish friends for Syrian children. The friendship-share coefficient is reported in percentage-point units. All specifications control for school fixed effects and the full set of child and parental controls used in the main analysis. Syrian-child specifications additionally include Syrian-specific controls used in the main analysis. Standard errors clustered at the classroom level are in parentheses. Stars denote $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Starting with the evidence for Turkish children, in the linear specification, a higher refugee share reduces the number of Turkish friends and increases the number of Syrian friends. In terms of size, the coefficient in column (2) of Table 2 implies that a one standard deviation (SD) increase in refugee share leads to a 0.32 decrease ($22.66 \times 0.014 = 0.32$) in the number

of Turkish friends, relative to a mean of 1.8 Turkish friends among Turkish children. The coefficient in column (4) implies that a one SD increase in refugee share leads to a 17.2 percentage-point increase in the share of interethnic friends ($22.66 \times 0.758 = 17.2$). The tercile specification points in the same direction: both medium- and high-refugee-share groups have fewer Turkish friends, more Syrian friends, and higher interethnic friendship shares than low-refugee-share groups. However, we cannot reject equality of the coefficients of the medium and high refugee-share groups for the number of Turkish friends ($p = 0.44$, column 2) or the interethnic friendship share ($p = 0.71$, column 4).

For Syrian children, the results indicate that a higher refugee share increases the number of Syrian friends and reduces the number of Turkish friends. In the linear specification, a one SD increase in refugee share leads to a 0.50 increase ($22.66 \times 0.022 = 0.50$) in the number of Syrian friends, relative to a mean of 2.21 Syrian friends among Syrian children. The coefficient in column (4) implies that a one SD increase in refugee share reduces the share of interethnic friends by 10.9 percentage points ($22.66 \times 0.480 = 10.9$). In the tercile specification, we find evidence of a statistically significant difference for both the number of Syrian friends and the interethnic friendship share when comparing the medium- to the low-refugee-share group. The coefficient in column (2) of Panel B of Table 2 indicates that being in the medium refugee-share group is associated with an increase in the number of Syrian friends of 0.69. The difference between the high and low groups is smaller, 0.47, and not statistically significant, though we cannot reject equality of the coefficients on the medium and high groups ($p = 0.49$). The coefficient in column (4) indicates that being in the medium refugee-share group is associated with an 18.5 percentage-point reduction in the share of interethnic friends. High-refugee-share groups also tend to have lower interethnic friendship shares than low-refugee-share groups. We again fail to reject equality of the coefficients on the medium- and high-refugee-share groups ($p = 0.71$).

Overall, the analysis of friendship networks indicates that the ethnic composition of the children’s Summer Camp group influences the ethnic composition of their friendship network. A change in the refugee share changes both exposure to non-coethnic peers and the number of potential coethnic peers, so these reduced-form estimates combine mechanical opportunity effects with children’s friendship choices conditional on those opportunities. Children tend to form more own-ethnicity friendships when their own group represents a larger share of the classroom. This can also be seen graphically in Figures 1 and 2, which plot two measures of homophily against the relative size of the refugee group in the class, separately for Syrian and Turkish children. Panel A reports the raw homophily index, H_e , defined as the share of

friends of children of ethnicity $e \in \{T, S\}$ who are coethnic. Panel B reports inbreeding homophily (Coleman, 1958), which compares realized same-ethnicity friendship shares with the benchmark implied by classroom composition.²⁰ Each dot in Figures 1 and 2 represents one of the 36 groups in our data, and the line is a quadratic fit. The figures show that greater exposure to children from the other ethnic group is associated with lower raw homophily for both Syrian and Turkish children. The inbreeding-homophily panels provide the corresponding composition-adjusted measure of the same relationship. The non-monotonicity and heterogeneous curvature by ethnicity is coherent with Currarini et al. (2009, 2010), suggesting the presence of ethnic biases or language barriers in the matching process.²¹

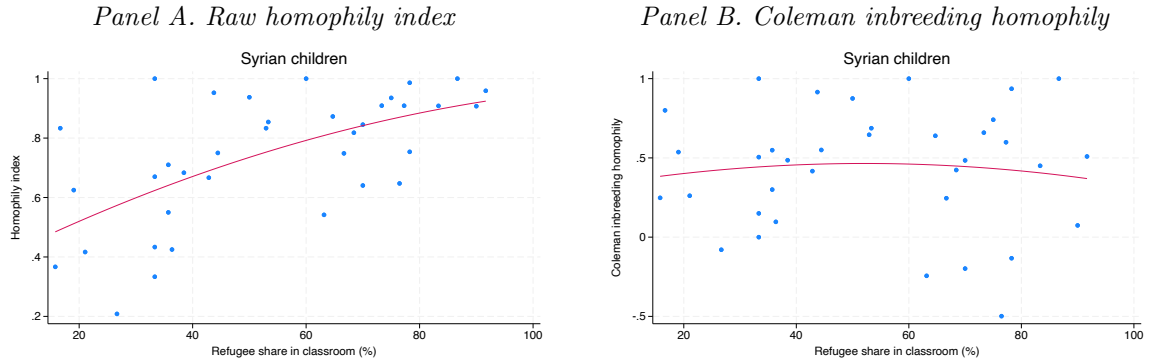


Figure 1: Homophily by refugee share: Syrian children.

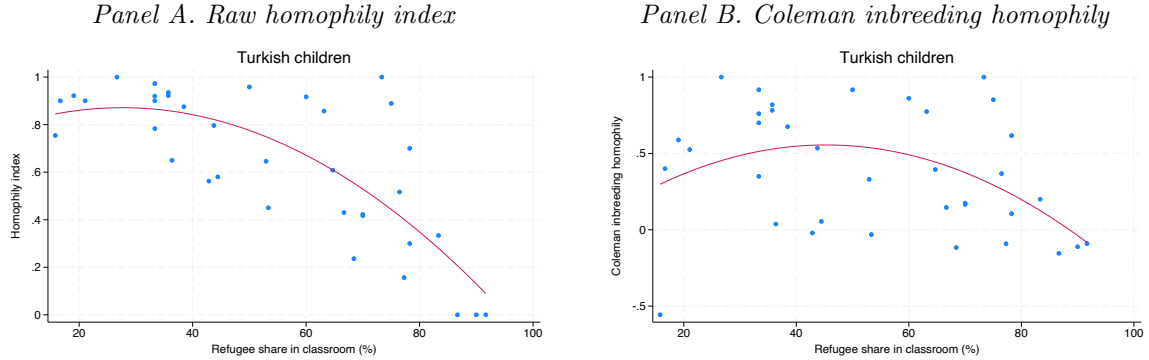


Figure 2: Homophily by refugee share: Turkish children.

²⁰Let q_e denote the share of children of ethnicity e in the classroom. The inbreeding-homophily index is defined as

$$IH_e = \frac{H_e - q_e}{1 - q_e}.$$

When $H_e > q_e$, children form more coethnic friendships than would be expected under random friendship formation given classroom composition, so $IH_e > 0$. When $H_e = q_e$, there is no inbreeding homophily beyond baseline classroom composition, and $IH_e = 0$. When $H_e < q_e$, children form fewer coethnic friendships than expected under random mixing, so $IH_e < 0$.

²¹In Currarini et al. (2009), the authors allow for ethnic biases in preferences as well as in the matching process. They show that the non-monotonicity of inbreeding homophily is the result of biases in the matching process. In our context, and using their model, the non-monotonicity can therefore be explained either by ethnic biases in the matching process, or by larger communication costs for inter-ethnic matches.

4.3 Language Skills

We next investigate whether there are differences in language skill acquisition for Syrian children, depending on the share of refugees in their group. Table 3 presents regression results of our baseline linear and the tercile specifications where the outcome is a binary variable defined on whether the child has high or low skills. Recall that language skills are reported on a scale from 1 to 6. We define as high-skill those children who are assessed to be 4 or higher (about 60% of the sample in the endline, and 25% in the baseline). Appendix Figure A5 provides classroom-level visual evidence by plotting the share of Syrian children with high Turkish-language skill at endline, net of school fixed effects, against classroom refugee share.

The first thing to note across columns 2 and 3 of the table is a positive and robust association between level of language skills at baseline and endline. With regards to the treatment effect of interest, the effect of refugee share is negative and statistically significant. A one SD increase in refugee share leads to a 9.1 percentage-point reduction in the probability of having high language skills ($22.66 \times 0.004 = 0.091$). The tercile specification indicates that the effect is non-linear, as there is a difference in language skills for children in high refugee share relative to those with medium or low shares (the p -value for comparison of high to medium is 0.003). In particular, the high share group is 30 percentage points less likely to be high skill than those in the low share group, which indicates a significant reduction over the baseline of 60%.

Overall, the above findings suggest that the classroom’s ethnic composition has a significant bearing on the development of Turkish language skills among the refugee children.

4.4 Absenteeism

We obtained school administrative data on the *absenteeism* of children in our sample up to March 2020, that is, 9 months after children started the Summer Camp.²² Absenteeism, which is measured by the total number of absent days from school, is a meaningful outcome as it captures the *attachment* and *integration* into the educational system but is also a measure of *noncognitive skills* (Jackson, 2018), and has been shown to impact academic achievement in early grade levels (Gottfried, 2010). Moreover, Lounsbury et al. (2004) show that absenteeism is strongly correlated (in the expected direction) with all Big Five personality traits—Agreeableness, Conscientiousness, Emotional Stability, Extroversion, and Open-

²²We were not able to match only three Syrian children in the school administrative data, quite possibly because their families moved.

Table 3: Language (Syrian children)

	[1]	[2]	[3]
Panel A - Linear Specification			
Refugee share	-0.005*** (0.001)	-0.005*** (0.001)	-0.004** (0.002)
Language Baseline		0.420*** (0.053)	0.392*** (0.051)
Panel B - Tercile Specification			
Refugee share (Medium)	-0.114 (0.086)	-0.126* (0.072)	-0.146 (0.095)
Refugee share (High)	-0.352*** (0.084)	-0.367*** (0.067)	-0.299*** (0.092)
Language Baseline		0.420*** (0.054)	0.395*** (0.052)
School fixed effects	Yes	Yes	Yes
Controls	No	No	Yes
# of obs.	328	328	328

Notes: The sample consists of Syrian children. The dependent variable measures the Turkish language skills (0/1) of Syrian children in the endline. Controls included are the same as in Table 2. Standard errors are clustered at classroom level. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

ness—which strongly predict school and labor market success later in life (Heckman et al., 2006; Borghans et al., 2008).

Overall, the school records indicate that Syrian children were more absent from school than Turkish children. The average days of absence was 5.8 among Syrian children and 4.3 among Turkish children. This difference is statistically significant according to a t-test and a Mann-Whitney test (p-values of 0.0013 and 0.0009, respectively).

To assess whether exposure to non-coethnic children during the Summer Camp had an impact on children’s school absenteeism, we estimate versions of equations (1) and (2) with days of absence from primary school acting as the outcome of interest. The results estimated by OLS are reported in Table 4—we obtain similar results estimating Poisson regressions. For Syrian children (columns 1 and 2), using the linear specification reported in Panel A, we find that being in a class with a larger share of refugee children during the Summer Camp led to more days of absence in the following academic year. The effect is not negligible: taking the coefficient estimated in column 2 that includes controls (0.048), we find that a one standard deviation increase in the share of refugee children in the class (22.66 percentage points) leads to an increase in absenteeism by 1.09 days, or an 18.8% increase over the average. The tercile

Table 4: Medium-term Effects of Summer Camp on Absenteeism

	Syrian children		Turkish children	
	[1]	[2]	[3]	[4]
Panel A - Linear Specification				
Refugee share	0.047*	0.048**	-0.008	-0.018
	(0.024)	(0.023)	(0.024)	(0.030)
Panel B - Tercile Specification				
Medium Share	0.802	1.108	-0.202	-0.369
	(1.197)	(1.240)	(0.714)	(0.913)
High Share	2.434*	1.490	0.073	-0.887
	(1.439)	(1.379)	(2.024)	(2.384)
School fixed effects	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
# of obs.	325	325	276	276

Notes: The dependent variable is the number of absent days from school in the academic year following the Summer Camp. Controls include those in Table 2, for the Turkish and Syrian subsamples, respectively. Standard errors are clustered at classroom level. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

specification reported in Panel B indicates positive effects of being in a medium or high share refugee groups on subsequent absenteeism (relative to being in a small refugee share group), although these estimates are not precisely estimated. On the other hand, for Turkish children (columns 3 and 4), the estimates are smaller and not statistically significant.

These results provide some evidence that, for Syrian children, exposure to Turkish children during the Summer Camp had a lasting positive impact on their integration into the education system that carried over to primary school.

4.5 Medium-term Effects

In this section, we examine whether the Summer Camp program had a medium-run impact on children’s outcomes measured after the Summer Camp. Indeed, students who participated in the Summer Camp in July-August 2019 went on to start primary school in the following academic year (2019-20), starting in September 2019. Primary school attendance is free and compulsory for all children in Turkey.

Using administrative school records, we are able to track the academic performance of the children who participated in the Summer Camp, as they moved on to primary school in the next academic year. In particular, we have obtained the grades of the students from the semester following the Summer Camp in 3 subjects: Turkish language, Math, and Life

Sciences.²³ Note that these children’s first year of primary school was interrupted by school closures in March 2020 due to the Covid-19 pandemic. Remote education was provided for the remainder of the academic year.

To assess whether exposure to non-coethnic children during the Summer Camp had an impact on children’s medium-term educational development, we estimate versions of equation (1) with grades from primary school acting as the outcome of interest. Grades range from 1 to 3. Tables 5 and 6 report both the linear refugee-share specification and the corresponding tercile specification, with the low-refugee-share group omitted. For Syrian children, we find that being in a class with a larger share of co-ethnic children during the Summer Camp led to lower grades in Turkish language in the following academic year (Panel A, column 2 of Table 5). In terms of magnitude, taking the estimate in column 2 we observe that a one SD increase in the refugee share leads to a 0.2 SD reduction in grade. The tercile specification in Panel B points in the same direction, although the medium- and high-refugee-share coefficients are not statistically significant. We do not find any significant effects of classroom ethnic composition during the Summer Camp on Math or Life Sciences grades (columns 3-6), although the magnitudes of these effects are not very dissimilar to those for Turkish language. For Turkish children, we do not find any significant impact of Summer Camp mixing on any of those outcomes (see Table 6). This conclusion is unchanged in the tercile specification.

5 Concluding Remarks

Integrating refugee children into national education systems poses serious challenges for host countries. In this paper, we evaluate the impact of an early childhood program implemented in the summer of 2019 in Turkey, targeting disadvantaged 5-year-old refugees and native children with no earlier access to formal early childhood education. During this summer camp, we implemented a randomized field experiment with the goal of examining the effect of random interethnic mixing on friendship formation and language skills.²⁴

We find that increased exposure to children of the other ethnicity leads to an increase in the formation of interethnic friendships. We also find a significant improvement in Turkish

²³The Life Sciences subject is taught in the first three years of primary education in Turkey and it evolves into two separate subjects (natural/applied sciences and social sciences) after year four. The curriculum of the first year includes basic topics on family, school life, health/hygiene/personal care, environment, nature (animals, plants, solar system), the country, and local culture.

²⁴It is possible that other educational inputs (e.g., parents or teachers) could also be reacting and adjusting their effort to the ethnic share faced by their children in the Summer Camp. Understanding the possible mediating role of these other inputs is left for future research.

Table 5: Medium-term Effects of Summer Camp on Turkish Language, Math, & Life Science; Syrian children

	Turkish Language		Math		Life Sciences	
	[1]	[2]	[3]	[4]	[5]	[6]
<i>Panel A. Linear specification</i>						
Refugee share	-0.004 (0.003)	-0.006** (0.003)	-0.003 (0.003)	-0.004 (0.003)	-0.004 (0.004)	-0.005 (0.003)
<i>Panel B. Tercile specification</i>						
Medium refugee share	-0.090 (0.144)	-0.118 (0.168)	-0.073 (0.147)	-0.161 (0.146)	-0.040 (0.168)	-0.138 (0.165)
High refugee share	-0.113 (0.133)	-0.097 (0.149)	-0.177 (0.176)	-0.086 (0.148)	-0.166 (0.209)	-0.134 (0.190)
School fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes
# of obs.	325	325	325	325	325	325

Notes: The table reports effects of classroom refugee share on medium-term school grades. Panel A reports the linear classroom refugee-share specification. Panel B reports the tercile specification, with the low-refugee-share tercile omitted. Grade outcomes are administrative grades from the academic year following the Summer Camp. All specifications include school fixed effects. Controls are the full set of child and parental controls used in the main analysis; Syrian-child specifications additionally include Syrian-specific controls. Standard errors clustered at the classroom level are in parentheses. Stars denote $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table 6: Medium-term Effects of Summer Camp on Turkish Language, Math, & Life Science; Turkish children

	Turkish Language		Math		Life Sciences	
	[1]	[2]	[3]	[4]	[5]	[6]
<i>Panel A. Linear specification</i>						
Refugee share	-0.001 (0.001)	-0.001 (0.002)	0.000 (0.001)	0.000 (0.002)	0.001 (0.001)	0.001 (0.001)
<i>Panel B. Tercile specification</i>						
Medium refugee share	0.010 (0.033)	0.024 (0.041)	0.000 (0.036)	-0.007 (0.039)	0.013 (0.015)	0.020 (0.023)
High refugee share	-0.040 (0.092)	0.007 (0.102)	0.040 (0.085)	0.070 (0.119)	0.124*** (0.039)	0.142** (0.065)
School fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes
# of obs.	276	276	276	276	276	276

Notes: The table reports effects of classroom refugee share on medium-term school grades. Panel A reports the linear classroom refugee-share specification. Panel B reports the tercile specification, with the low-refugee-share tercile omitted. Grade outcomes are administrative grades from the academic year following the Summer Camp. All specifications include school fixed effects. Controls are the full set of child and parental controls used in the main analysis; Syrian-child specifications additionally include Syrian-specific controls. Standard errors clustered at the classroom level are in parentheses. Stars denote $p < 0.10$, $p < 0.05$, and $p < 0.01$.

language skills for Syrian children and that exposure to Turkish children during the summer camp had a lasting positive impact on their language skills, as measured by their grades in Turkish language in primary school nine months later. These results are important in light of evidence that language skills early in a child’s life cycle affect subsequent educational and labor market outcomes (e.g., [Cunha and Heckman, 2007](#); [Bleakley and Chin, 2010](#); [Aucejo and James, 2021](#)). Reassuringly, for Turkish children we do not find a negative impact of exposure to Syrian children on their primary school grades, thereby indicating that the learning benefits for refugees do not come at a cost for native students.

Beyond Turkey, the impacts of mixing on friendship segregation and language skills we identify contribute to the broader debate around the social integration of refugee and immigrant children. It is well-documented that language proficiency is a key driver of immigrant integration as it increases job opportunities and facilitates social and political participation ([Chiswick and Miller, 2015](#)). Our results indicate that mixing children from the host country with children from immigrant families at an early age may be effective in improving the language skills of immigrant children and their social integration. Since classroom composition shapes these outcomes, the degree of mixing in a classroom is clearly a key policy margin. We hope that our work will stimulate more research on this topic in other contexts.

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Ethnic Mixing in Early Childhood

Supplemental Appendix

By Vincent Boucher, Semih Tumen, Michael Vlassopoulos, Jackie Wahba and Yves Zenou

A Additional Tables

A.1 Descriptive statistics

Table A1: Comparison of children in our sample to those in other Schools (Fall 2019)

	a. Experiment schools (part.)		b. Experiment schools (non-part.)		c. Neighborhood schools		d. Province schools	
	R	N	R	N	R	N	R	N
1st grade								
Male (=1)	0.52	0.50	0.51	0.49	0.51	0.49	0.50	0.49
Number of siblings	3.41	2.31	3.12	2.27	3.09	2.29	3.04	2.23
Pre-school attendance (=1)(*)	1.00	1.00	0.23	0.72	0.25	0.73	0.24	0.75
Father's education (years)	5.38	8.25	5.41	8.56	5.71	8.48	6.92	9.04
Mother's education (years)	3.25	6.84	3.28	7.01	3.47	7.19	4.44	7.51
Origin is Aleppo	0.94	-	0.89	-	0.92	-	0.82	-
4th grade								
Turkish scores	-	-	58.17	73.66	57.66	74.11	60.22	76.67
Math scores	-	-	56.27	72.77	55.93	71.99	59.52	75.23
School absences		-	7.64	3.45	7.45	3.27	6.98	3.03
# of students (1st grade)	198	176	221	389	1,987	2,892	9,482	31,014
# of students (4th grade)	-	-	246	524	1,234	2,517	5,146	26,885
# of schools		11		11		56		405

Notes: R: Refugee, N: Native. The 4th grader comparison serves to compare schools (addresses the question whether experiment schools are selected or not). The 1st grader stats directly compare the students. Neighborhood schools are defined as the schools located in the immediate vicinity of the experiment schools. Neighborhood schools exclude experiment schools. Province schools include all primary schools within the province (excluding neighborhood and experiment schools). (*) Summer Camp attendance counts as pre-school education.

Summary statistics: Outcome variables (means), by group

	All sample			Syrian			Turkish		
	[1]	[2]	[Diff]	[1]	[2]	[Diff]	[1]	[2]	[Diff]
LOW SHARE									
Turkish language skills	-	-	-	2.89	4.23	1.34	-	-	-
# of friends	2.26	2.60	0.34	2.58	2.87	0.28	2.14	2.50	0.35
# of Syrian friends	0.65	0.69	0.04	1.53	1.57	0.04	0.32	0.36	0.04
# of Turkish friends	1.61	1.91	0.29	1.06	1.30	0.25	1.82	2.13	0.31
% of own ethnicity friends	0.71	0.80	0.09	0.52	0.56	0.04	0.78	0.88	0.10
Number of obs.	194			53			141		
MEDIUM SHARE									
Turkish language skills	-	-	-	2.06	3.70	1.64	-	-	-
# of friends	2.35	2.65	0.30	2.22	2.70	0.48	2.51	2.58	0.08
# of Syrian friends	1.28	1.62	0.35	1.67	2.19	0.53	0.81	0.93	0.12
# of Turkish friends	1.07	1.03	-0.05	0.56	0.51	-0.05	1.70	1.65	-0.04
% of own ethnicity friends	0.67	0.74	0.07	0.68	0.80	0.12	0.66	0.67	0.01
Number of obs.	197			108			89		
HIGH SHARE									
Turkish language skills	-	-	-	2.33	4.17	1.84	-	-	-
# of friends	2.58	2.89	0.31	2.68	2.88	0.20	2.22	2.91	0.70
# of Syrian friends	2.25	2.30	0.05	2.41	2.43	0.02	1.65	1.83	0.17
# of Turkish friends	0.33	0.59	0.26	0.26	0.45	0.19	0.57	1.09	0.52
% of own ethnicity friends	0.67	0.78	0.11	0.78	0.86	0.08	0.25	0.45	0.21
Number of obs.	213			167			46		

Table A2: Notes: [1] indicates the baseline; [2] indicates the endline; [Diff] indicates the between the two. The sample consists of children of age 5. The study includes 36 classrooms in 11 schools in the Gaziantep region. There are 604 children in the sample (328 Syrian, 276 Turkish; 310 male, 294 female).

Parental characteristics: Summary Statistics

	All sample		Syrian		Turkish	
	Mother	Father	Mother	Father	Mother	Father
Parental education						
No degree (illiterate)	11.6	7.5	18.6	11.9	3	2.2
No degree (literate)	21.2	9.6	35.4	16.2	4.4	1.8
Primary school	37.6	35.4	29.0	36.6	47.8	34.1
Secondary school	17.7	26.8	10.4	23.2	26.5	31.2
High school	8.1	13.6	3.1	6.4	14.1	22.1
College & above	3.8	7.1	3.7	5.8	4.0	8.7
Parental employment						
Non-employed	95.7	4.5	95.7	5.5	95.7	3.3
Employed	4.3	95.5	4.3	94.5	4.3	96.7
Composition of parents' friends						
All refugees	7.5		13.4		0.4	
Mostly refugees	26.0		45.4		2.9	
Balanced mix	25.2		39.0		8.7	
Mostly natives	8.8		1.2		17.8	
All natives	32.6		0.9		70.3	
Composition of neighbors						
All refugees	6.1		9.2		2.5	
Mostly refugees	32.6		45.4		17.4	
Balanced mix	26.0		39.0		10.5	
Mostly natives	8.4		2.1		15.9	
All natives	26.8		4.3		53.6	

Table A3: Summary statistics—parental characteristics: All entries are percentages. The sample consists of children of age 5. There are 604 children in the sample (328 Syrian, 276 Turkish). There were 638 children in the initial allocation list and 34 of them (16 refugees and 18 natives by ethnicity; 15 females and 19 males by gender) dropped out at various stages of the program. The attrition rate is approximately 5%. The parental characteristics of the dropouts are quite similar to those of the participated children. In particular, the employment rate among mothers and fathers of the dropouts are 8.8% and 94.1%, respectively. Similarly, the fractions of less than high school educated mothers and fathers of the dropouts are 85.3% and 79.4%, respectively. There are no statistically significant differences between the observable characteristics of participating children and dropouts.

Region of residence in Syria		
Region	Number	Percent
Aleppo	308	93.9
Deir-ez-Zor	5	1.5
Idleb	5	1.5
Damascus	4	1.2
Hama	3	0.9
Homs	2	0.6
Ar-Raqqa	1	0.3
Total	328	100

Table A4: Summary statistics—region of residence in Syria prior to displacement: The sample consists of Syrian children of age 5. The study includes 36 classrooms in 11 schools in the Gaziantep region. There are 328 children in the Syrian sample.

Table A5: Year of arrival to Turkey among Syrian children

Year of arrival to Turkey		
Year	Number	Percent
2011	6	1.8
2012	26	7.9
2013	71	21.6
2014	88	26.8
2015	71	21.6
2016	42	12.8
2017	15	4.6
2018	9	2.7
Total	328	100

Notes: The table reports the distribution of Syrian children by year of arrival in Turkey.

Syrian parents' Turkish language skills		
Skill level	Number	Percent
None	64	19.5
Some understanding	115	35.1
Spoken	132	40.2
Spoken & written	17	5.2
Total	328	100

Table A6: Summary statistics—Turkish language skills of Syrian parents: The sample consists of the parents of Syrian children of age 5. The study includes 36 classrooms in 11 schools in the Gaziantep region.

A.2 Balancing Tests

Balancing Tests for Ethnic Composition of Class: Linear Specification						
Dependent Variable	All		Syrians		Turkish	
	Refugee	p-value	Refugee	p-value	Refugee	p-value
	Share		Share		Share	
	(1)	(2)	(3)	(4)	(5)	(6)
Gender	-0.080	0.594	-0.230	0.250	0.224	0.312
Mother's educ.	0.077	0.626	0.094	0.656	0.209	0.110
Father's educ.	0.083	0.596	0.081	0.790	0.108	0.138
Number of siblings	0.782	0.152	-0.337	0.793	1.241	0.000
Mother employed	0.078	0.099	0.141	0.159	-0.052	0.552
Father employed	-0.021	0.776	-0.073	0.389	-0.035	0.678
Parents' Friends	-0.036	0.884	-0.234	0.533	0.025	0.861
Neighborhood	0.016	0.939	-0.455	0.187	0.382	0.081
<i>Syrian only</i>						
Turkish skill (base)			-0.082	0.341		
Aleppo			-0.099	0.274		
Arrival year			1.103	0.309		
Turkish skills of Parents			-0.327	0.341		

Table A7: Notes: Each entry of column (1) reports coefficients from a regression of the variable indicated in the first column on the share of refugees and also controls for nationality and school fixed effects. Column (2) reports the respective p-value of the estimated coefficient. The rest of the columns report similar information for the subsample of Syrian (columns 3 and 4), and Turkish (column 5 and 6) children. Standard errors are clustered at classroom level. Mother's and Father's education is a binary variable that takes the value of 1 if the person has obtained primary education and above and 0 otherwise. Ethnic composition of Parents' Friends and Neighborhood is a binary variable that takes the value of 1 if all or the majority of friends or neighbors are co-ethnic and 0 otherwise. Region of origin is a binary variable that takes the value of 1 if it is Aleppo and 0 otherwise.

Balancing Tests for Ethnic Composition of Class: Tercile Specification

Dependent Variable		All		Syrians		Turkish	
		Refugee	p-value	Refugee	p-value	Refugee	p-value
		Share		Share		Share	
		(1)	(2)	(3)	(4)	(5)	(6)
Gender	(Med)	-0.014	0.724	0.020	0.829	-0.049	0.484
	(High)	-0.080	0.320	-0.066	0.498	0.051	0.716
Mother's educ.	(Med)	0.133	0.016	0.107	0.314	0.125	0.003
	(High)	0.058	0.440	0.140	0.184	0.074	0.192
Father's educ.	(Med)	0.096	0.049	0.128	0.263	0.087	0.000
	(High)	0.060	0.406	0.080	0.567	0.044	0.347
Number of siblings	(Med)	0.154	0.409	0.101	0.837	0.245	0.024
	(High)	0.364	0.219	-0.253	0.739	0.793	0.000
Mother employed	(Med)	0.009	0.493	0.056	0.094	-0.025	0.369
	(High)	0.044	0.126	0.088	0.038	-0.033	0.410
Father employed	(Med)	-0.019	0.328	-0.094	0.000	0.024	0.401
	(High)	0.018	0.690	-0.034	0.452	0.000	0.996
Parents' Friends	(Med)	0.037	0.612	0.008	0.953	0.085	0.023
	(High)	0.071	0.643	-0.090	0.670	0.169	0.105
Neighborhood	(Med)	0.010	0.886	-0.059	0.670	0.072	0.289
	(High)	0.047	0.747	-0.153	0.470	0.161	0.355
<i>Syrian only</i>							
Turkish skill (base)	(Med)			-0.030	0.918		
	(High)			-0.436	0.259		
Aleppo	(Med)			-0.027	0.287		
	(High)			-0.090	0.128		
Arrival year	(Med)			0.486	0.281		
	(High)			0.286	0.649		
Turkish skills of Parents	(Med)			-0.245	0.185		
	(High)			-0.193	0.318		

Table A8: Notes: Each entry of column (1) reports coefficients from a regression of the variable indicated in the first column on refugee share tercile dummies and also controls for nationality and school fixed effects. Column (2) reports the respective p-value of the estimated coefficient. Standard errors are clustered at classroom level. The rest of the columns report similar information for the subsample of Syrian (columns 3 and 4), and Turkish (column 5 and 6) children. Mother's and Father's education is a binary variable that takes the value of 1 if the person has obtained primary education and above and 0 otherwise. Ethnic composition of Parents' Friends and Neighborhood is a binary variable that takes the value of 1 if all or the majority of friends or neighbors are co-ethnic and 0 otherwise. Region of origin is a binary variable that takes the value of 1 if it is Aleppo and 0 otherwise.

Table A9: Robustness to Reweighting, School Exclusions, and Alternative Tercile Definitions

	Turkish children Share interethnic friends	Syrian children Share interethnic friends	Syrian children High Turkish- language skill
<i>Panel A. Linear refugee-share specification</i>			
Baseline	0.758*** (0.221)	-0.480** (0.214)	-0.004** (0.002)
IPW	0.739*** (0.202)	-0.420* (0.220)	-0.005** (0.002)
Drop high-imbalance schools	0.805*** (0.228)	-0.465* (0.259)	-0.003* (0.002)
<i>Panel B. Medium refugee-share tercile</i>			
Baseline	22.479*** (7.033)	-18.502** (7.433)	-0.146 (0.095)
IPW	20.191*** (5.970)	-19.206*** (6.616)	-0.137 (0.089)
Drop high-imbalance schools	22.574*** (6.978)	-17.094** (7.836)	-0.122 (0.091)
Equal classroom terciles	22.479*** (7.033)	-18.502** (7.433)	-0.146 (0.095)
<i>Panel C. High refugee-share tercile</i>			
Baseline	27.445** (13.071)	-21.045** (9.793)	-0.299*** (0.092)
IPW	27.692** (12.403)	-22.501** (9.623)	-0.398*** (0.088)
Drop high-imbalance schools	26.976** (12.255)	-18.623* (10.271)	-0.282*** (0.094)
Equal classroom terciles	27.445** (13.071)	-21.045** (9.793)	-0.299*** (0.092)
Baseline observations	276	328	328
IPW observations	270	322	322
Drop high-imbalance observations	235	268	268

Notes: The table reports robustness checks for the main friendship and language outcomes. Panel A reports coefficients from the linear classroom refugee-share specification. Panels B and C report coefficients on the medium- and high-refugee-share tercile indicators, respectively, with the low-refugee-share tercile omitted. For Turkish children, interethnic friends are Syrian friends. For Syrian children, interethnic friends are Turkish friends. IPW specifications use stabilized inverse-probability weights based on predicted tercile assignment, trimmed at the 1st and 99th percentiles. The high-imbalance-school specifications exclude schools classified as contributing most to observed covariate imbalance. Equal classroom terciles coincide with the original terciles because the original terciles already divide the 36 classrooms into three groups of 12 classrooms each. All specifications include school fixed effects and the full set of child and parental controls used in the main analysis. Standard errors clustered at the classroom level are in parentheses. Stars denote $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table A10: Classroom Refugee Share and Tercile Composition

	N	Mean	SD	Min	p25	Median	p75	Max
<i>Panel A. Refugee-share moments</i>								
Classroom-level	36	53.87	22.66	15.79	34.52	53.14	74.17	91.67
Child-weighted	604	54.30	22.48	15.79	33.33	53.33	75.00	91.67
	Classes	Mean	Min	Max	Children	Syrian	Turkish	
<i>Panel B. Tercile composition</i>								
Low refugee share	12	28.36	15.79	36.36	194	53	141	
Medium refugee share	12	54.06	38.46	68.42	197	108	89	
High refugee share	12	79.19	70.00	91.67	213	167	46	

Notes: Panel A reports moments of classroom refugee share. The classroom-level row treats each classroom as one observation. The child-weighted row treats each child in the analysis sample as one observation and therefore weights classrooms by enrollment. Panel B reports the composition of the low-, medium-, and high-refugee-share terciles. In Panel B, the columns labelled Mean, Min, and Max refer to classroom refugee share, measured in percentage points; the columns labelled Syrian and Turkish report child counts by nationality. The original terciles divide the 36 classrooms into three equal groups of 12 classrooms each.

Table A11: Leave-One-School-Out Robustness

	Turkish Interethnic friends	Syrian Interethnic friends	Syrian High Turkish skill
Baseline estimate	0.758***	-0.480**	-0.004**
Baseline standard error	(0.221)	(0.214)	(0.002)
Minimum leave-one-out estimate	0.618	-0.685	-0.005
Maximum leave-one-out estimate	1.088	-0.378	-0.002
Same sign as baseline	11/11	11/11	11/11
Significant at 10%	11/11	11/11	10/11
Significant at 5%	11/11	5/11	7/11
Baseline observations	276	328	328

Notes: The table reports leave-one-school-out robustness checks for the main friendship and language outcomes. The baseline estimate uses the full sample. Each leave-one-out estimate re-estimates the baseline linear refugee-share specification after omitting one school. For Turkish children, interethnic friends are Syrian friends. For Syrian children, interethnic friends are Turkish friends. Friendship-share coefficients are reported in percentage-point units. All specifications include school fixed effects and the full set of child and parental controls used in the main analysis. Syrian-child specifications additionally include Syrian-specific controls where used in the main analysis. Standard errors are clustered at the classroom level. Stars denote $p < 0.10$, < 0.05 , and $p < 0.01$.

B Additional Figures

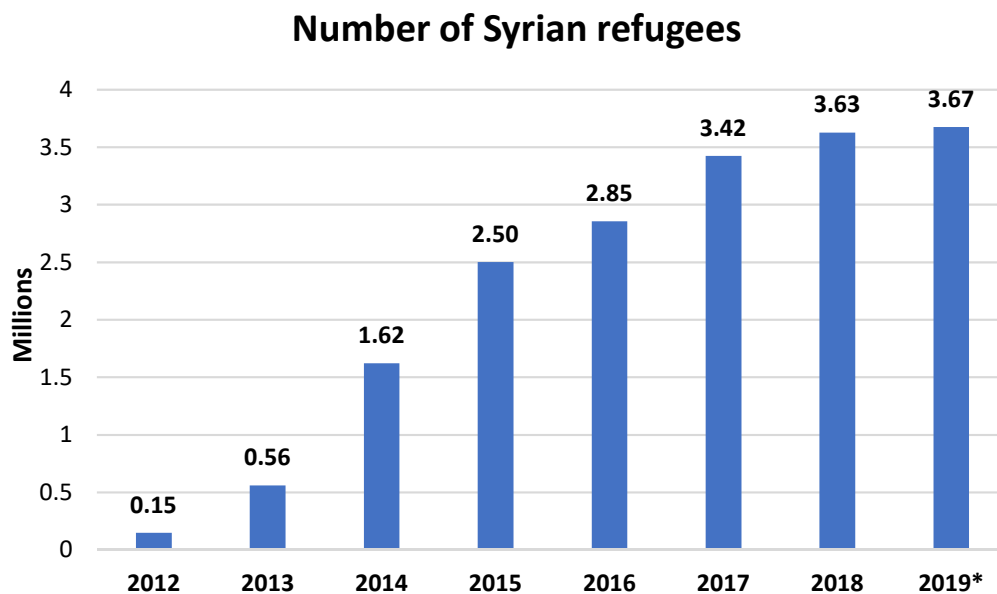


Figure A1: Number of Syrian refugees in Turkey over years. Data source is the UNHCR. The numbers correspond to registered Syrian refugees. The 2019 figure is as of October 10, 2019. There are approximately 370,000 registered refugees from other nationalities. The total number of registered refugees is above 4 millions.

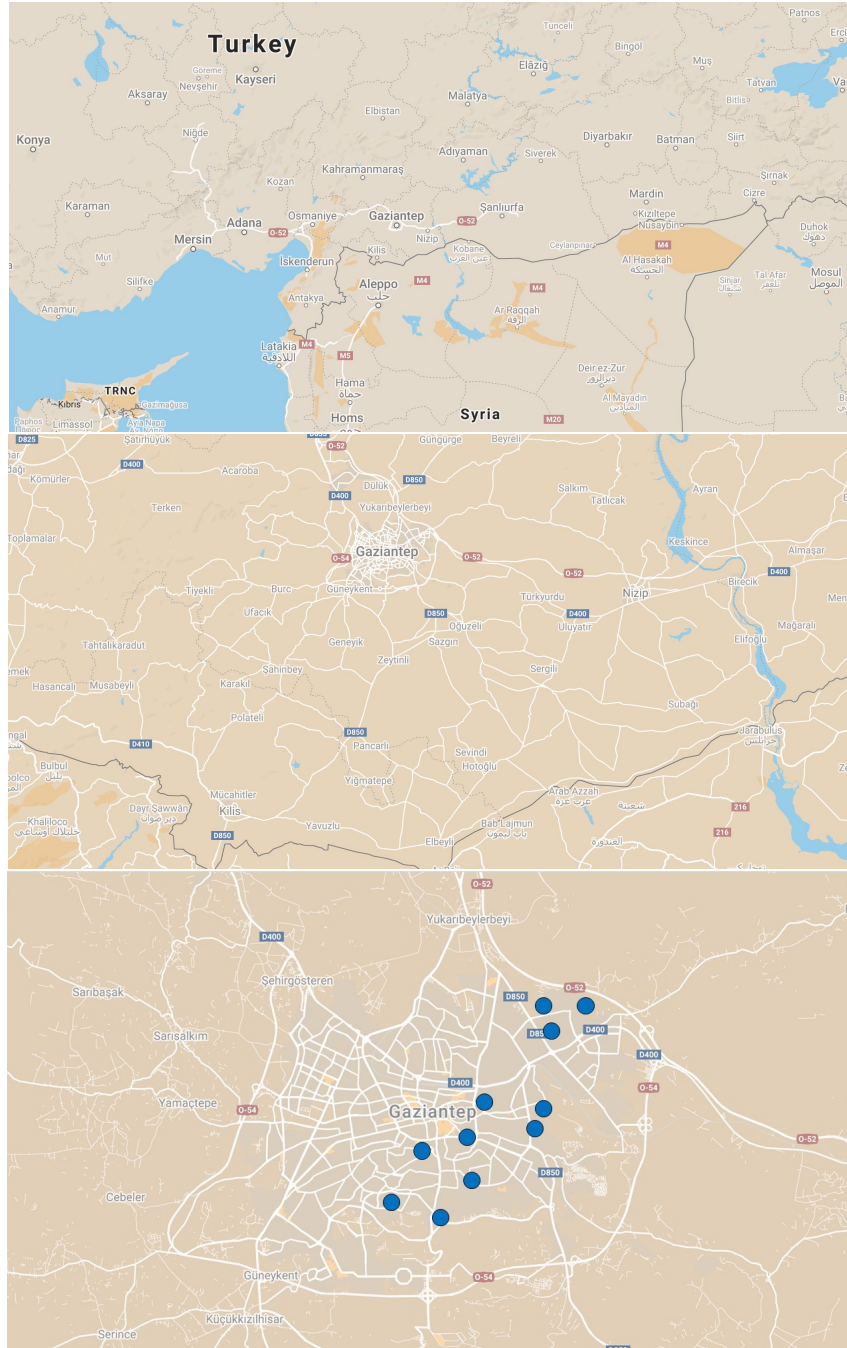


Figure A2: Locations of schools. The maps start from a general view of the Syrian border region of Turkey and zooms into inner-city Gaziantep. The map at the bottom marks the locations of the 11 schools in which our randomized field experiment is implemented.

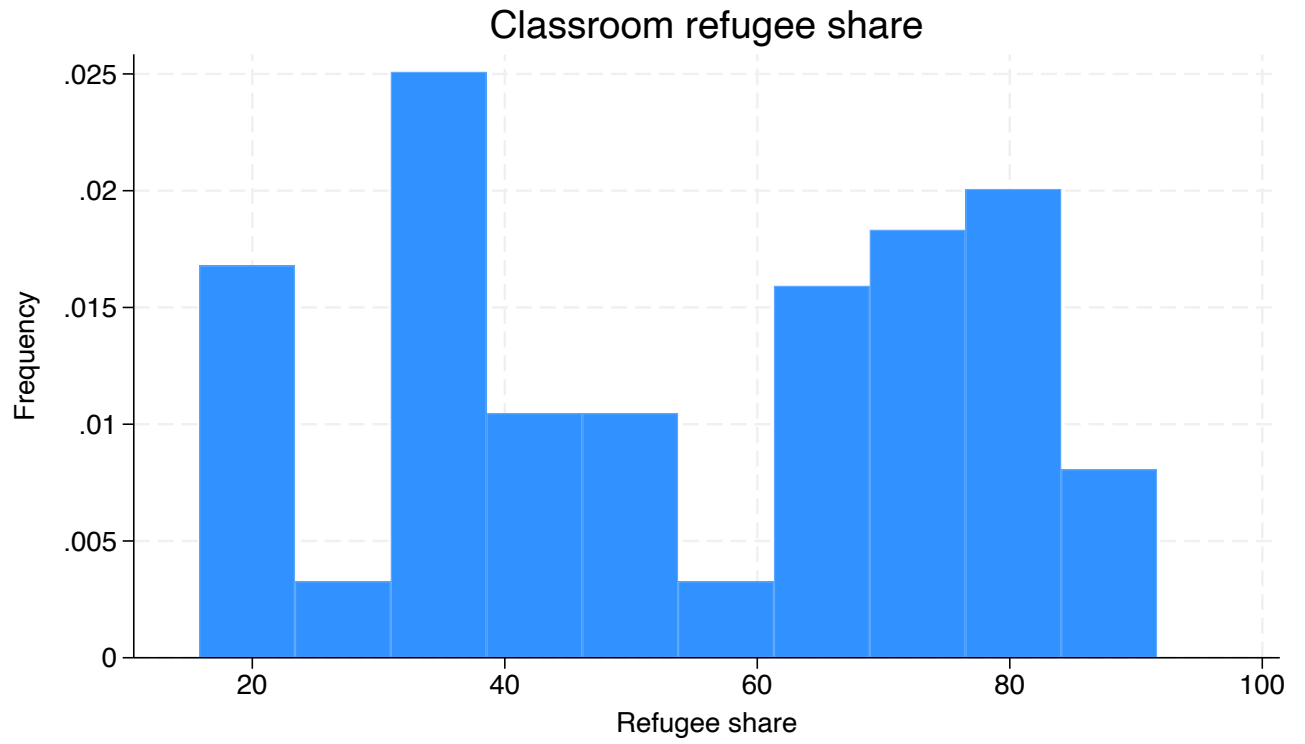


Figure A3: Distribution of refugee share across groups. The sample consists of Syrian children of age 5. The study includes 36 classrooms in 11 schools in the Gaziantep region.

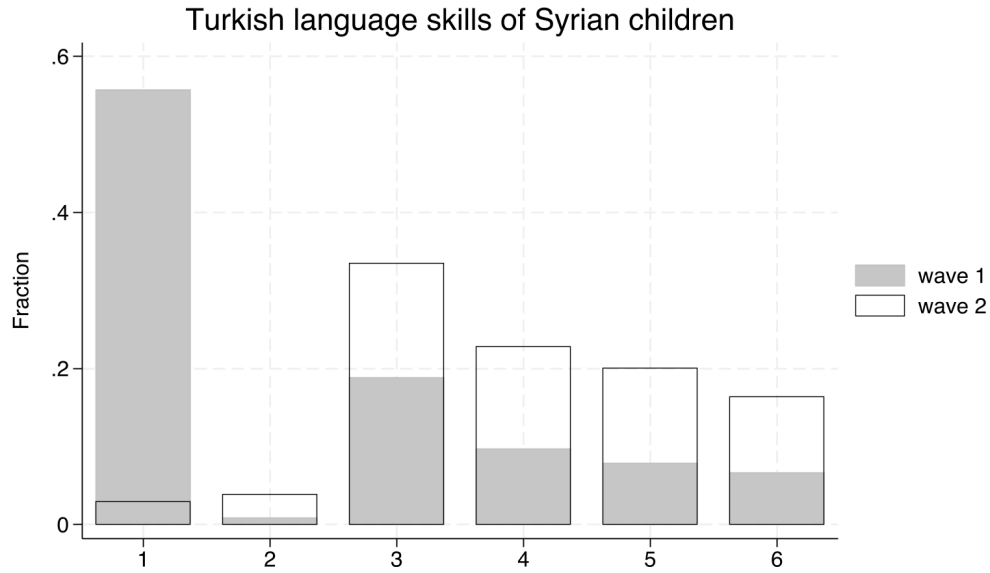


Figure A4: Distribution of Turkish language skills among Syrian children. The figure reports the distribution of teacher-assessed Turkish language skills at baseline and endline for Syrian children.

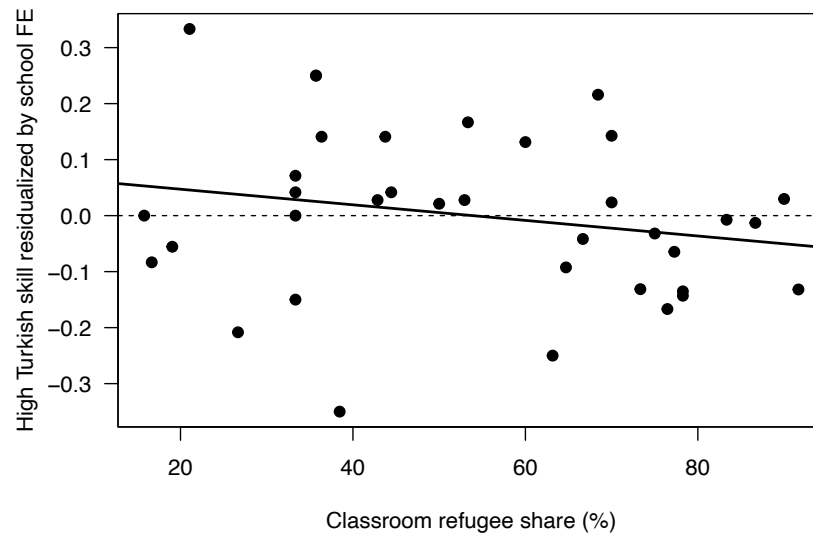


Figure A5: Syrian children's Turkish-language skill by classroom refugee share, net of school fixed effects. The figure plots classroom-level residuals from a regression of the share of Syrian children with high Turkish-language skill at endline on school fixed effects, against classroom refugee share. Each dot represents one classroom. The fitted line is a linear fit through the residualized outcome.

C Prosocial Behavior

In this section, we report results concerning our measure of prosocial behavior, which we elicited by means of a simple dictator game, which we call the Sticker Game. The Sticker Game was carried out by the teacher as follows. The teacher and the child sat at a table facing each other. The teacher gave 10 stickers to the child and clearly explained that all the stickers belonged to the child. Then the teacher put two envelopes on the table: one for the child and the other for another random child in the classroom. There was no hint regarding the ethnicity or gender of the other child, so the recipient could be interpreted as an average child in the class.¹ Then the teacher closed his or her own eyes, asked the child to put the stickers that the child wanted to share into the other child's envelope, and put the rest into his or her own envelope. Next, the teacher asked the child to take his or her own envelope and leave the table. After the child left, the teacher counted and recorded the stickers in the envelope. Note that because the ethnic composition varies across groups, so does the expected identity of the recipient. This means that our setting allows us to examine whether children's willingness to share is affected by whether they are more likely to share with a coethnic or a non-coethnic child.

Table A12 presents regression results on prosocial behavior for the whole sample, while Tables A13 and A14 present separate results for Turkish and Syrian children, respectively. Starting with the results in Panel A of Table A12, we find a negative effect of the share of refugees on sharing that is statistically significant, even after controlling for various characteristics of the children and their parents. The results in Panel B further indicate that the effect is mildly nonlinear, as the negative effect of being in a high-refugee-share group, relative to being in a low-refugee-share group, is larger in absolute value, albeit statistically indistinguishable, from that of the medium-refugee-share group (p -value of test for equality of coefficients in our preferred specification in column (3) is 0.105).

When examining the subgroups, what emerges is that this negative effect is driven mainly by Turkish children. Both the linear and the tercile specifications in Table A13 suggest a negative and statistically significant effect of refugee share on the sharing of Turkish children. The coefficient of the high-refugee-share group is more negative than that of the medium-refugee-share group, though the difference is not statistically significant (p -value = 0.105). In terms of the magnitude of the effect, taking the estimates of our preferred specification in column (3), a Turkish child in a high-refugee-share group gives 1.9 fewer stickers than a child

¹Given the sensitive context and the young age of participating children, we refrained from asking them to share with a target recipient of a specific ethnicity in mind, and left the ethnicity and gender of the recipient undefined. This implies that, for a given child, we could not observe whether their preferences for sharing varied by the ethnicity of the recipient, but we can still draw inferences on whether, at the group level, there is an ethnic bias in preferences for sharing.

Table A12: Stickers given to random classmate (All sample)

Stickers given to random classmate (All sample)			
	[1]	[2]	[3]
Panel A - Linear Specification			
Refugee share	-0.022*** (0.006)	-0.019*** (0.006)	-0.024*** (0.005)
Sticker Baseline		0.223*** (0.037)	0.226*** (0.036)
Panel B - Tercile Specification			
Refugee share (Med)	-0.889*** (0.285)	-0.798*** (0.233)	-0.872*** (0.228)
Refugee share (High)	-1.209*** (0.384)	-1.020*** (0.336)	-1.360*** (0.323)
Sticker Baseline		0.224*** (0.036)	0.227*** (0.035)
School fixed effects	Yes	Yes	Yes
Controls	No	No	Yes
# of obs.	604	604	604

in a low-refugee-share group, which is 45% of what Turkish children give on average. Thus, the effect is quite sizable.

Table A13: Stickers given to random classmate (Turkish children)

	[1]	[2]	[3]
Panel A - Linear Specification			
Refugee share	-0.035*** (0.007)	-0.030*** (0.006)	-0.030*** (0.007)
Sticker Baseline		0.209** (0.079)	0.190** (0.085)
Panel B - Tercile Specification			
Refugee share (Med)	-0.958*** (0.302)	-0.865*** (0.267)	-0.936*** (0.251)
Refugee share (High)	-2.124*** (0.555)	-1.845*** (0.512)	-1.896*** (0.595)
Sticker Baseline		0.214*** (0.078)	0.194** (0.084)
School fixed effects	Yes	Yes	Yes
Controls	No	No	Yes
# of obs.	276	276	276

On the other hand, for Syrian children the coefficients on the share of refugees presented in Table A14 are—perhaps surprisingly—also negative, but are smaller numerically and not robust in terms of statistical significance. This indicates that Syrian children do not discriminate ethnically when sharing. If anything, there is some evidence in Panel B of Table A14 that they share less in groups in which the recipient is more likely to be a coethnic, though these differences are not robust.

Table A14: Stickers given to random classmate (Syrian children)

	[1]	[2]	[3]
Panel A - Linear Specification			
Refugee share	-0.012 (0.009)	-0.013 (0.007)	-0.018* (0.010)
Sticker Baseline		0.240*** (0.046)	0.235*** (0.045)
Panel B - Tercile Specification			
Refugee share (Med)	-0.821** (0.390)	-0.793** (0.321)	-0.531 (0.376)
Refugee share (High)	-0.760 (0.494)	-0.723 (0.428)	-0.884* (0.517)
Sticker Baseline		0.238*** (0.045)	0.232*** (0.043)
School fixed effects	Yes	Yes	Yes
Controls	No	No	Yes
# of obs.	328	328	328

The finding that Turkish children share less in high-refugee-share groups, where the expected recipient is a Syrian child, than they do in low-refugee-share groups, where the expected recipient is a Turkish child, is indicative of a tendency for in-group favoritism. That Syrian children display a weaker tendency for in-group favoritism, or even a tendency for out-group favoritism, is perhaps not too surprising in light of previous evidence that this behavior is more prevalent among members of “high-status” groups (e.g., [Sachdev and Bourhis, 1991](#)).