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# The Impact of COVID-19 on Peer Relationships: Insights from Classroom Social Networks

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# The Impact of COVID-19 on Peer Relationships: Insights from Classroom Social Networks\*

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## Abstract

We analyze the impact of the COVID-19 outbreak on classroom peer relationships using a unique field dataset collected from 3rd and 4th-grade students in Turkey. Using data from both pre-pandemic and pandemic cohorts, we find significant changes in social interactions among the pandemic cohort after prolonged school closures. We observe varying effects contingent upon the nature of peer relationships. While friendship relationships deteriorated, some facets of academic support relationships among classmates display enhancement. However, this progress is exclusively observed among native students, as opposed to refugees. Additionally, we uncover significant improvements in inter-ethnicity and inter-gender relationships in classrooms after COVID-19.

JEL Codes: D85, I21, I24, I28, J15, J16

Keywords: Peer relationships; COVID-19; classroom social networks; refugees

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# 1 Introduction

The father of the French school of sociology, Emile Durkheim, states that a socially cohesive society should exhibit an absence of social conflicts and foster robust social bonds among its members (Durkheim, 2005). These societies are characterized by reciprocal social relationships and a sense of belonging among their members. According to Gradstein and Justman (2002), the foundations of such a society can be laid out by public education as it has a significant socializing force that facilitates social cohesion. Schools with a good social climate provide an excellent platform for social cohesion to appear (Maszk et al., 1999; Alan et al., 2021a). They serve as the primary environment where individuals establish and nurture their peer relationships, which are integral to social integration.

Peers are perhaps one of the most essential parts of an individual’s education journey, as they contribute not only to academic achievements (Wentzel, 2017; Sacerdote, 2001; Dufflo et al., 2011; Berthelon et al., 2019; Feld and Zölitz, 2017; Lavy and Sand, 2019; Calvó-Armengol et al., 2009; Hahn et al., 2015; Wang and Eccles, 2013) but also to various other outcomes, including socio-emotional skills and mental health (Kiessling and Norris, 2020; Kochenderfer-Ladd and Ladd, 2019; Wentzel, 2017; Bietenbeck, 2020). As such, peer relationships play a fundamental role in child development, and schools have a crucial responsibility in fostering social cohesion through peer interactions.

Nonetheless, the platform that plays a crucial role in promoting social cohesion by facilitating peer relationships witnessed a large disruption during the COVID-19 pandemic. In response to the global spread of COVID-19 in the spring of 2020, governments worldwide implemented various measures to control the transmission of the virus, including the widespread closure of educational institutions. These closures impacted over 90 percent of the world’s student population, roughly 1.5 billion students in more than 190 countries.<sup>1</sup> As students spend a substantial amount of time in school with their peers, these closures deprived them of their primary social environment. In addition, other safety measures such as lockdowns and social distancing further reduced social interaction among peers.<sup>2</sup> All of these attributes together, in conjunction with other effects of the COVID-19 pandemic

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<sup>1</sup>Accessed on the UNESCO website <https://en.unesco.org/covid19/educationresponse#schoolclosures> in November 2022.

<sup>2</sup>Survey evidence indicates that during the severe periods of the COVID-19 pandemic, students were meeting with their friends significantly less frequently (Werner and Woessmann, 2021).

on students,<sup>3</sup> bring about the concern that the COVID-19 pandemic may have continuing impacts on students even after the relaxation of pandemic restrictions and their return to school.

In this paper, we look at how COVID-19 has impacted peer relationships in the classroom. We explore the innate complexity of social interactions using insights from social network theory (Jackson, 2011). As the pandemic is likely to impact each student differently, we further examine heterogeneities<sup>4</sup> in the impact based on gender, refugee status, and district-level socioeconomic status (SES).<sup>5</sup> To answer our research questions, we employ a cross-cohort comparison strategy which allows us to uncover causal estimates based on the comparability assumption of our cohorts. This assumption implies that the pandemic cohort’s potential outcomes would be the same as those of the pre-pandemic cohort in the absence of the pandemic.<sup>6</sup>

We address our research question by utilizing unique and rich data collected in Turkey as part of a large-scale study on early childhood educational interventions. Our data encompasses two cohorts of primary school students, with the first wave collected in 2018, serving as the pre-pandemic cohort for our analysis. The second wave of data was collected in 2021 after schools reopened following COVID-19, and we refer to this cohort as the pandemic

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<sup>3</sup>It is important to emphasize that the COVID-19 pandemic not only led to school closures and reductions in social interactions but also impacted students’ physical, emotional and mental health, as well as that of their parents and teachers. It also influenced their work styles, time management, and family financial status. These factors can potentially affect children’s social, cognitive, and socioemotional development. Even if schools remained open, it is possible that we would still observe changes in students’ outcomes due to the pandemic. In essence, apart from the closure of schools, the COVID-19 pandemic introduced changes across multiple dimensions. All these changes can directly and indirectly impact students’ development. More importantly, they may interact with other dimensions, making it even more difficult to disentangle the pure effects of school closures from other contributing factors. For this reason, we present our findings as the overall consequence of COVID-19, rather than solely attributing them to the impact of school closures or the reduction in social interaction.

<sup>4</sup>In addition to our primary analysis of heterogeneity outlined herein, we also conduct examinations of heterogeneity based on factors such as teacher demographics, teaching styles, teachers’ characteristics from students’ perspective, parenting styles, and SES indicators, as presented in the appendix (see Table C1, C2, C3, C4, and C5 respectively). However, we refrain from defining most of these variables as our covariates due to their potential lack of pre-determination, which could lead to bad control issues; in other words, they may be influenced by COVID-19. Consequently, we do not present the heterogeneity analysis of these variables as our primary heterogeneity results for the same reason.

<sup>5</sup>The province from which we collected data is located close to the Syrian border, resulting in many Syrians fleeing the war to settle in this Turkish province. As a result, a substantial portion of the sample we use comprises Syrian refugee children. This piques our interest in understanding whether natives and refugees are affected differently by the COVID-19 shock.

<sup>6</sup>The details and the justifications of this identification assumption are discussed in Section 4.

cohort. The data comprises students' self-reported social network nominations, encompassing three layers of peer relationships: friendship, academic support, and emotional support. Moreover, it includes numerous other variables related to students, classrooms, teachers, and parents.

Our empirical analysis provides strong evidence that the COVID-19 pandemic caused various changes in peer relationships within the classroom. Most importantly, our analysis reveals the differential impact of the pandemic on different dimensions of peer relationships. We observe a significant deterioration of friendship relationships, while the pandemic led to a significant rise in academic support relationships among peers. In the domain of friendship networks, the number of nominations that an average student receives decreased considerably, leading to an increase in the share of isolated students by 22%. Conversely, in academic support networks, students in the post-pandemic cohort received approximately 20% more nominations than their pre-pandemic counterparts. This is accompanied by a substantial decrease in the likelihood of isolation in academic support networks. The change in received nominations also translates into changes in the reciprocity of students' nominations, particularly strongly for friendship networks. Analyses of heterogeneity reveal notable distinctions between refugees and native students, particularly evident in academic support networks, where improvements detected in the pooled sample are entirely attributable to native students, and in friendship networks, where the adverse effects are notably more pronounced for refugees. In the second part of our analyses, we further document significant changes in inter-group relationships. Overall, our results suggest a decline in ethnic segregation driven by a lower propensity of refugees nominating refugees. We also document a decline in gender segregation within classrooms, resulting from both males and females showing a greater tendency to nominate individuals of the opposite gender.

Our paper makes a twofold contribution. Firstly, while many studies have demonstrated the short-term impact of the COVID-19 pandemic on various student outcomes, including academic performance (Maldonado and De Witte, 2021; Grewenig et al., 2021; Engzell et al., 2021; Hanushek, 2020; Kuhfeld et al., 2020; Kogan and Lavertu, 2021; Hevia et al., 2022; Lichand et al., 2022; Vegas, 2022; Ardington et al., 2021; Betthäuser et al., 2023; Alan and Turkum, 2024), mental health (Shah et al., 2020; Loades et al., 2020; Imran et al., 2020; de Miranda et al., 2020; De Figueiredo et al., 2021; Singh et al., 2020), socio-emotional development (Egan et al., 2021; Linnavalli and Kalland, 2021; Alan and Turkum, 2024), and educational inequalities (Agostinelli et al., 2022; Maldonado and De Witte, 2021; Betthäuser et al., 2023; Hanushek, 2020; Engzell et al., 2021; Bacher-Hicks et al., 2021; Kogan and

Lavertu, 2021), none have investigated how the pandemic influenced peer interaction in the classroom. Therefore, we provide the first study to examine how peer relationships in the classroom change in response to the shock of COVID-19. Our empirical evidence on this relationship contributes to the literature on the impact of COVID-19 on children and social networks. In addition to our primary contribution, we underscore the importance of onsite education and peer interaction in fostering children’s skill development, aligning with previous research highlighting the significance of social interactions in educational settings (Lin et al., 2024; Gauvain, 2016; Rardin and Moan, 1971; Gifford-Smith and Brownell, 2003), thereby contributing to the empirical literature on children’s skill formation. Through our research, we aim to raise policymakers’ awareness of the need to consider social skill development while designing educational programs to mitigate the potential long-lasting effects of the COVID-19 pandemic on students in affected cohorts.

The rest of the paper proceeds as follows: In section 2, we briefly provide the background. In Section 3, we describe the data set and the outcomes that we investigate, then in Section 4, we lay out the empirical strategy, and explain the empirical results in Section 5. In Section 6, we explore potential mechanisms underlying the results, and we conclude with our final remarks in Section 7.

## 2 Background

In response to the first Covid-19 cases detected on March 11, 2020, the Turkish government swiftly enacted stringent measures. As one of these measures, schools were temporarily closed for two weeks, starting from March 13, 2020. However, in line with recommendations from the Scientific Committee, the school closure extended further due to the high number of Covid-19 cases. Despite multiple attempts to reopen schools, Turkey experienced one of the most prolonged school closures worldwide, lasting a total of 49 weeks from March 2020 to September 2021.<sup>7</sup> This duration far exceeds both the world and OECD averages of 37.85 and 35.42 weeks, respectively.<sup>8</sup> To clarify, the duration of the closure in Turkey is longer than a typical academic year, which lasts for around 36-37 weeks.

Throughout the school closures, all actors in education, including the Ministry of Edu-

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<sup>7</sup>Schools remained closed for most of the 2020-2021 academic year, owing to the Turkish government’s recognition of schools as significant channels of social mobility. This decision aimed to prioritize public health and mitigate the potential spread of the virus.

<sup>8</sup>Accessed on the UNESCO website <https://en.unesco.org/covid19/educationresponse#schoolclosures> in February 2023.

cation, school authorities, teachers, parents, and students, made efforts to establish remote learning methods. The Ministry of Education began broadcasting lectures that followed the original curriculum, and teachers attempted to deliver lectures over Zoom and exchange materials and assignments via WhatsApp. However, the effectiveness of these methods relied heavily on the economic resources of students' parents and their level of attention to their children's educational well-being. According to the 2019 Household Information Technologies Usage Survey by Turkey Statistical Institute (TurkStat),<sup>9</sup> only 48.7% of households had portable computers such as laptops, and tablets. This number was even lower among low-income households, and given that these technological tools are typically shared among siblings, it is clear that students from these households faced significant physical difficulties with online education, leading to a disconnection from their peers.

In addition to closure and certain restrictions in educational institutions, various curfews and social distancing measures were implemented in Turkey in response to the COVID-19 pandemic. Curfews were imposed for citizens under the age of 20 and over 65, which later extended to everyone during certain hours of the day. Measures were put in place to limit public gatherings and transportation. The government adjusted these measures according to the dynamics of the pandemic. These measures significantly reduced the opportunities for social interaction, exacerbating the already limited possibilities for peer interaction caused by school closures.<sup>10</sup>

## 3 Data

### 3.1 Data Description

Our data set comprises data collected from two different cohorts, pre-pandemic and pandemic, from the same schools and grade levels, 3rd and 4th graders (aged 8-10). The pre-COVID data set is a subset of large-scale RCTs focused on early childhood interventions

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<sup>9</sup>Accessed on the TurkStat website [https://data.tuik.gov.tr/Bulten/Index?p=Hanehalki-Bilisim-Teknolojileri-\(BT\)-Kullanim-Arastirmasi-2020-33679](https://data.tuik.gov.tr/Bulten/Index?p=Hanehalki-Bilisim-Teknolojileri-(BT)-Kullanim-Arastirmasi-2020-33679) in February 2023.

<sup>10</sup>The channels discussed in this section represent common direct factors influencing peer interactions. However, it is crucial to reemphasize that other elements, including parental input, health and financial concerns, mental and emotional stress, and experiences like the loss of a family member, may also contribute to the changes we have observed in classroom peer relationships following the pandemic. These factors can exert both direct and indirect influences on peer interactions and often interact with one another, complicating the identification of precise causes for the outcomes we have documented. Therefore, we present our findings as the collective impact of COVID-19, rather than solely attributing them to school closures or reduced social interaction.

on skill formation in Turkey. These RCTs aim to evaluate the effectiveness of skill-based programs in enhancing academic performance.<sup>11</sup> We visited the schools where pre-pandemic data was collected right after in-person education resumed in September 2021 to gather data on the pandemic cohort.<sup>12</sup> Since the pre-pandemic (2018) and pandemic (2021) cohorts are from the same schools, they show almost identical characteristics.

For our analysis sample, initially, we excluded 5 classrooms due to missing information provided by teachers. Subsequently, an additional 15 classrooms were removed as they became singletons and thus did not contribute to any within-school variation. Out of the resulting sample, the pre-COVID subset includes 5,109 students from 66 primary schools and 174 classes, with 1,208 3rd-grade students and 3,901 4th-grade students and the pandemic cohort includes 5,178 3rd and 4th-grade students from 65 primary schools and 171 classes. Of these students, 1,218 are 3rd-graders, and 3,960 are 4th-graders.<sup>13</sup>

The research team and trained field assistants helped to carry out both data collection processes. During data collection, teachers were occupied with their surveys in isolated rooms, ensuring that all students' data collection occurred in the absence of teachers. The collected data set is extensive and covers a large sample of students. It contains information on various aspects of the students, classroom social networks, teachers, classroom characteristics, and parents.

## 3.2 Variables

The focus of our study is to evaluate the impact of the COVID-19 shock on students' peer relationships utilizing tools from social network theory. For this purpose, during data collection, we asked students to nominate up to three classmates<sup>14</sup> for three layers of peer relationships - friendship, academic support, and emotional support - with overlaps allowed.<sup>15</sup>

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<sup>11</sup>We exclusively use the baseline data from these RCTs, which means the sample has not been subjected to any treatment.

<sup>12</sup>It is essential to emphasize that both data collection occurs at the start of the academic year.

<sup>13</sup>Note that these numbers include the students who were absent on the day that we visited their classrooms.

<sup>14</sup>Before collecting our dataset, we conducted pilot studies several times. Based on the results of these pilot studies, we decided to limit the number of classmates students nominate to three. Although it was feasible to allow students to nominate more than three classmates (4 and 5 nominations were experimented with as well) in the social network elicitation surveys, we opted against it due to concerns about consuming a significant amount of class time and making it challenging for students to fill out larger templates. Additionally, our cross-cohort comparisons maintain internal validity because we utilized the same measurement inventory for both cohorts.

<sup>15</sup>Survey questions for eliciting social network outcomes are given in appendix Figure B1 .

Based on students’ self-reported nominations, we construct several social network measures. The balance of these outcomes across cohorts can be found in Table 1.<sup>16</sup>

**Table 1:** Balance of Social Network Outcomes

	(1)	(2)	(3)	(4)	(5)
	Mean of 2018	Mean of 2021	Difference	p-value	N
<b>Friendship:</b>					
Isolate	0.225	0.283	0.058	0.000	10287
In-degree ties	2.230	1.841	-0.389	0.000	10287
Reciprocity	0.381	0.281	-0.100	0.000	10287
Clustering coef.	0.358	0.248	-0.110	0.000	10287
<b>Academic Support (provided):</b>					
Isolate	0.366	0.339	-0.027	0.076	10287
In-degree ties	1.188	1.402	0.214	0.000	10287
Reciprocity	0.139	0.166	0.027	0.014	10287
Clustering coef.	0.149	0.148	-0.001	0.952	10287
<b>Academic Support (received):</b>					
Isolate	0.459	0.393	-0.066	0.000	10287
In-degree ties	1.113	1.312	0.199	0.000	10287
Reciprocity	0.116	0.139	0.023	0.012	10287
Clustering coef.	0.154	0.149	-0.005	0.657	10287
<b>Emotional Support (provided):</b>					
Isolate	0.320	0.321	0.001	0.927	10287
In-degree ties	1.516	1.590	0.074	0.072	10287
Reciprocity	0.189	0.189	-0.000	0.961	10287
Clustering coef.	0.222	0.189	-0.033	0.001	10287
<b>Emotional Support (received):</b>					
Isolate	0.310	0.342	0.032	0.007	10287
In-degree ties	1.585	1.511	-0.074	0.070	10287
Reciprocity	0.219	0.188	-0.031	0.006	10287
Clustering coef.	0.236	0.179	-0.057	0.000	10287

Note: All social network measures are elicited via students’ self-reported nominations for given social network types. Differences are calculated by subtracting the mean of 2018 from the mean of 2021. Associated p-values are obtained by regressing the outcome variable on the COVID dummy, which takes the value 0 for the cohort of 2018 and the value 1 for the cohort of 2021, controlling for school fixed effects.

In the first part of the analysis, we aim to document the changes in the structure of stu-

<sup>16</sup>In addition to the social network data, we collected academic outcomes (math and verbal test scores) from the pandemic cohort both at the start and end of the 2021/2022 academic year, allowing us to examine the relationship between peer relationships and academic performance. These tests are designed in accordance with the national curricula of the respective grades since there is no centralized test for the grade levels in the dataset. They are constructed by standardizing the correct answers given by students in these tests. The supplementary dataset collected at the end of the academic year includes students who were not newly enrolled and whose data were available at the start of the 2021/22 academic year. It is important to note that social network variables were not collected at the end of the academic year due to them not being the primary focus of the fieldwork and logistical constraints. As a result, we lack information on the lasting effects of the pandemic on social network outcomes.

dents’ friendship, academic support, and emotional support networks. For this purpose, we summarize students’ social networks with the outcomes of isolate, in-degree ties, reciprocity, and clustering coefficient. Our first two outcomes directly depend on the nominations that each student receives from their classmates. *Isolate* is a binary variable that takes the value 1 if the student did not receive any nominations from their classmates and the value 0 if the student received any nominations (Alan et al., 2021b). *In-degree ties* describe the total number of nominations a student receives from their classmates, serving as a measure of a student’s popularity within their classroom. Our third social network measure, *reciprocity*, considers the ratio of reciprocal nominations to all nominations of a student. Reciprocal relationships are expected to be of superior quality, serving as indicators of higher cooperation and trust, thereby fostering a more cohesive environment (Durkheim, 2005). On the other hand, *clustering coefficient* (Watts and Strogatz, 1998), also called transitivity, measures the well-connectedness of a student’s direct peers. It is an indicator for tightly-knit groups and is considered a proxy for trust (Karlan et al., 2009). More specifically, this measure calculates the ratio of a node’s neighbors that are connected between themselves to the number of all neighbors of that node. We use this measure calculated at the node (individual) level. It is important to note that for the computation of this measure, the direction of nodes is ignored.

In the second part of the analysis, we shift our focus to inter-group relationships based on ethnicity and gender. The primary outcome that we rely on for this part is Coleman’s excess homophily index. This measure describes the excess propensity of individuals to nominate their in-group members and is computed for each group separately at the classroom level. Using the notation in Alan et al. (2023), we can define Coleman’s excess homophily index as follows:

$$C_{ij} = \frac{s_{ij} - w_{ij}}{1 - w_{ij}}$$

where  $C_{ij}$  is the Coleman’s excess homophily index for group  $i$  in classroom  $j$ ,  $s_{ij}$  denotes the total amount of ties within-group  $i$  in classroom  $j$ ,  $t_{ij}$  is the total amount of ties of group  $i$  in classroom  $j$  and finally  $w_{ij}$  denotes the populations share of group  $i$  in classroom  $j$ . Its values range from -1 to 1, going from heterophily to homophily. Higher values represent a higher propensity to have a tie with an in-group node. Additionally, to reveal the source of change in Coleman’s excess homophily index, we look at the number of outgoing ties of each student towards in-groups and out-groups.<sup>17</sup>

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<sup>17</sup>Summary statistics of all social network measures are reported in the appendix in Tables A1, A2, A3,

Besides social network outcomes, we use control variables that fall into three categories: student, teacher, and classroom characteristics. Student characteristics include gender and refugee status. Teacher characteristics comprise gender, age, years of experience, number of children, and marital status. Classroom characteristics involve the share of males and refugees in the classroom. The balance of these control variables across cohorts are presented in Table 2.<sup>18</sup>

**Table 2:** Balance of Covariates

	(1)	(2)	(3)	(4)	(5)
	Mean of 2018	Mean of 2021	Difference	p-value	N
<b>Student characteristics:</b>					
Male	0.511	0.514	0.003	0.684	10287
Refugee	0.164	0.184	0.020	0.090	10287
<b>Classroom characteristics:</b>					
Share of males	0.510	0.514	0.004	0.634	345
Share of refugees	0.162	0.185	0.023	0.167	345
<b>Teacher characteristics:</b>					
Male	0.323	0.373	0.050	0.295	345
Age	42.807	43.529	0.722	0.525	345
Experience in years	18.883	19.693	0.810	0.444	345
Married	0.833	0.826	-0.007	0.866	345

Note: All variables are obtained via survey answers from students and teachers. Differences are calculated by subtracting the mean of 2018 from the mean of 2021. Associated p-values are obtained by regressing the outcome variable on the COVID dummy, which takes the value 0 for the cohort of 2018 and the value 1 for the cohort of 2021, controlling for school fixed effects.

A4 and A5.

<sup>18</sup>In addition to our main outcome variables (network measures), academic outcomes, and the covariates detailed in Table 2, our dataset encompasses a more extensive array of variables. These additional variables are presented in the appendix Table D1, categorized into four main groups: SES indicators, parenting styles, teaching styles, and students' perspective on teachers. Parenting styles are derived from the survey responses of students. We administered item response questions to students and employed principal component analysis to construct four distinct parenting styles: obedience, warmth, punishment, and reasoning. A sample of the questions posed to students is provided in Table E1 in the appendix. Similarly, teaching styles and teacher characteristics from students' perspectives have been extracted from the surveys conducted among both students and teachers, and these data have undergone principal component analysis. A sample of these questions can be found in the appendix (see Table E2). To offer an understanding of the underlying mechanisms driving our results, we have included socioemotional variables such as emotional empathy and impulsivity, as well as sociocognitive skills like cognitive empathy. The inventories for these data can be found in Table E3 and Figure B2 in the appendix, respectively. Socioemotional skills are derived using principal component analysis applied to the relevant items, providing us with standardized measures for each skill. Cognitive empathy, on the other hand, is constructed by standardizing the correct answers given by students in this assessment.

## 4 Empirical analysis

### 4.1 Identification

To investigate the impact of the COVID-19 pandemic on students’ classroom social network outcomes, this paper employs a cross-cohort comparison between pre-pandemic and pandemic cohorts. Specifically, we investigate how the pandemic cohort differs from the pre-pandemic cohort of the same grade levels from the same schools conditional on the individual, teacher, and classroom characteristics and school-fixed effects.

The validity of our study’s identification strategy depends on the comparability of the pre-pandemic and pandemic cohorts. To ensure a valid cross-cohort comparison, both groups must have similar potential outcomes. We have taken this criterion into account during our sample selection. This condition is likely fulfilled, as both cohorts originate from the same schools and classrooms, with only a three-year gap between them. In Turkey, public schools only admit students who reside within their designated catchment areas. This policy significantly reduces the likelihood of substantial socio-demographic changes occurring over only a three-year period. Moreover, the characteristics of teachers in public schools are also similar for these cohorts since public school teachers are appointed centrally, and the Covid pandemic did not cause any changes in the number or composition of teachers.<sup>19</sup> Lastly, in Turkey, the Ministry of Education mandates that students must be randomly assigned to their classes in their first year and remain with the same group until the end of fourth grade. This consistent allocation mechanism across cohorts minimizes potential confounding variables. Statistical evidence in Table 2 supports our claims, demonstrating no significant differences between these cohorts regarding student, teacher, and classroom characteristics.<sup>20</sup>

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<sup>19</sup>In Alan and Turkum (2024), an examination of data from 2015, 2018, and 2019 involving similar and identical schools as those in our dataset indicates the absence of a discernible pre-pandemic time trend regarding student, teacher, and classroom characteristics, as well as student cognitive and socioemotional skills. It is noteworthy that the schools selected for the educational project, which constitutes the source of our data, were chosen based on shared infrastructural and socio-demographic attributes, making them similar in these respects. Since the social network data for cohorts preceding the pandemic is only available for the 2018 cohort, we are unable to present time trends in our study. However, the extensive data utilized by Alan and Turkum (2024) empowers them to substantiate the absence of a pre-pandemic time trend.

<sup>20</sup>Table D1 in the appendix presents a balance table encompassing additional variables, including SES indicators, parenting styles, teaching styles, and teacher characteristics from students’ perspective. Because of the concern of bad controls, we carefully selected the control variables for our main regression analysis. We excluded potential variables that could themselves be outcomes in the regression, only including predetermined variables that are less likely to be affected by COVID-19. This approach helps minimize potential confounding factors. However, due to the limited covariate set stemming from concerns about bad

Therefore, any differences in observed outcomes can be attributed to the effects of COVID-19.

## 4.2 Estimation strategy

To examine the differences between the pre-pandemic and pandemic cohort in the outcomes of interest through a conditional mean analysis, we use the following empirical specification,

$$y_{is} = \alpha + \beta COVID19 + X_{is}\Gamma + \theta_s + \epsilon_{is}$$

where  $y_{is}$  is the outcome of interest for child  $i$  in school  $s$ , which regressed on the COVID19, which is a dummy variable for the pandemic cohort (2021), as well as other covariates that are likely to be predictive of the outcome  $y$ . The vector of student, teacher, and classroom characteristics, which can be found in Table 2, is denoted as  $X_{is}$ .  $\theta_s$  is the school fixed effect which enables us to discard all variation between schools. Standard errors,  $\epsilon_{is}$ , are clustered at the school level.

The variable of interest in this study is COVID19,<sup>21</sup> with the coefficient of interest being  $\hat{\beta}$ . It represents the impact of the COVID-19 pandemic on the outcome variables—the measures of social networks. In this context, the effect of the pandemic is commonly ascribed to school closures, curfews, and social distancing rules, which significantly constrained students’ opportunities for social interactions with their peers. However, it is imperative to acknowledge that the repercussions of the pandemic may extend well beyond these immediate consequences. The COVID-19 crisis could have had a far-reaching impact on a wide array of parameters, encompassing students’ physical, emotional, and mental health, their relationships with their parents, family financial situations, and more. These factors have the potential to exert a considerable influence on students’ social relationship formation.

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control, we also provide a more comprehensive balance table. Here, it becomes evident that the majority of the variables exhibit no statistically significant cohort-to-cohort variations. This observation reinforces our identification assumption that these cohorts are comparable.

<sup>21</sup>It is worth mentioning that the district or school-level data regarding variations in COVID-19 intensity is not available. However, we contend that the intensity of the pandemic remained relatively uniform across the districts within our sample for several reasons. First of all, our data is sourced from only one province, where we do not expect to see significant variations in the pandemic’s severity because of the consistent COVID-19 regulations, including social distancing and lockdown measures, enforced throughout the province. Additionally, all the schools in our dataset are public schools, and they strictly adhere to standardized rules and protocols set by the Ministry of Education concerning pandemic management. These combined factors contribute to the overall uniformity of our dataset, providing a consistent context for assessing the impact of COVID-19.

Therefore, when presenting our findings, we choose to adopt a more comprehensive perspective, considering the overall consequence of the COVID-19 pandemic, rather than exclusively attributing them to the impact of school closures or the reduction in social interaction. This approach enables us to highlight that the effects on students' social development may be multifaceted and shaped by a complex interplay of various interconnected factors.<sup>22</sup>

## 5 Results

This section presents the results of the empirical analysis. First, subsection 5.1 presents the main results derived from the above estimation equation, and then in subsection 5.2, we provide various heterogeneity analyses. For the second part of our analysis, we present results on inter-group relationships in subsection 5.3. Finally, subsection 5.4 details our robustness checks.

Before we proceed, we would like to state that due to the richness of the outcome variables, we only present the treatment (pandemic's) effect from the fully specified estimations, which control for school-fixed effects, student, teacher, and classroom characteristics. The unconditional treatment effects and their corresponding p-values are presented in Table 1 columns 3 and 4, respectively.

### 5.1 Main Results

The primary objective of this paper is to demonstrate the impact of the COVID-19 outbreak on peer relationships, as summarized by the social network outcomes presented in Table 3. In this section and the subsequent ones, we present the impact of COVID-19 on a selection of network statistics for each type of social network elicited in classrooms, namely friendship, academic support (provided), academic support (received), emotional support (provided), and emotional support (received).

In Panel 1 of Table 3, the impact of the pandemic on the likelihood of being an isolated student for various network types is presented, revealing significant and notable results. The students' friendship networks experienced the most substantial impact, with a large increase of 5 percentage points in the probability of not receiving any friendship nominations, a 22%

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<sup>22</sup>We present our findings as the overall consequence of COVID-19 because the available data does not provide the means to disentangle the individual components contributing to these outcomes.

**Table 3: Main Results**

	(1)	(2)	(3)	(4)	(5)
	Friendship	AS Provided	AS Received	ES Provided	ES Received
<b>Panel 1: Isolates</b>					
COVID	0.05*** (0.01)	-0.03* (0.02)	-0.07*** (0.02)	-0.01 (0.01)	0.02* (0.01)
Control Mean	0.23	0.37	0.46	0.32	0.31
Effect Size	0.22	-0.08	-0.16	-0.02	0.07
Romano-Wolf p	0.00	0.12	0.00	0.91	0.22
N	10287	10287	10287	10287	10287
R-Squared	0.09	0.07	0.09	0.08	0.09
<b>Panel 2: In-degree ties</b>					
COVID	-0.36*** (0.04)	0.22*** (0.04)	0.22*** (0.04)	0.10** (0.04)	-0.05 (0.04)
Control Mean	2.22	1.18	1.10	1.51	1.58
Effect Size	-0.16	0.19	0.20	0.07	-0.03
Romano-Wolf p	0.00	0.00	0.00	0.08	0.80
N	10287	10287	10287	10287	10287
R-Squared	0.08	0.08	0.09	0.09	0.10
<b>Panel 3: Reciprocity</b>					
COVID	-0.10*** (0.01)	0.02** (0.01)	0.02** (0.01)	0.00 (0.01)	-0.03*** (0.01)
Control Mean	0.38	0.14	0.11	0.19	0.22
Effect Size	-0.25	0.18	0.20	0.01	-0.14
Romano-Wolf p	0.00	0.04	0.04	0.96	0.09
N	10287	10287	10287	10287	10287
R-Squared	0.08	0.04	0.05	0.05	0.07
<b>Panel 4: Clustering coef.</b>					
COVID	-0.11*** (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.03*** (0.01)	-0.06*** (0.01)
Control Mean	0.36	0.15	0.15	0.22	0.23
Effect Size	-0.30	-0.04	-0.04	-0.15	-0.24
Romano-Wolf p	0.00	0.97	0.97	0.04	0.00
N	10287	10287	10287	10287	10287
R-Squared	0.08	0.05	0.06	0.06	0.07

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row and for the network type specified on top of columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

increase in terms of the effect size. In contrast, academic support networks exhibited positive changes. For both academic support provide and receive networks, the likelihood of a student being isolated declined considerably —3 percentage points for the former and 7 percentage points for the latter (equivalent to 8% and 16% in effect sizes). Concerning emotional support networks, COVID-19 led to a 2 percentage points increase in the probability of not being nominated when students were asked about receiving emotional support. However, there was a slight and statistically insignificant, decline of 1 percentage points in the probability of not receiving any nominations when students were asked about providing emotional support. These results suggest that COVID-19 might have had adverse effects on students’ various forms of peer relationships, potentially altering their interdependence.

In Panel 2, we present the impact of COVID-19 on students’ in-degree ties, which represents the total number of nominations a student received. This metric stands as one of the simplest and most effective methods of summarizing an individual’s popularity within a social network. While the minimum value of in-degree ties is 0 across all network types, the maximum value can go as high as the class size minus 1 in the extreme case in which a whole classroom nominates a student except the student herself.<sup>23</sup> Results indicate a similar direction for friendship and academic support networks. COVID-19 resulted in a reduction of 0.36 friendship nominations, equivalent to a 16% decline in terms of effect size. Conversely, there was a rise of 0.22 in nominations for both directions of academic support networks, leading to approximately a 20% increase in terms of effect size. The impact on emotional support network nominations varied depending on whether students nominated their peers as providers or recipients of emotional support. A statistically significant increase of about 7% in the number of nominations received when students nominated their peers to whom they provide emotional support. However, results showed a decline in the number of nominations when students nominated their peers from whom they receive emotional support, although this result was not statistically significant.

We extend our analysis further by examining the quality of peer relationships as measured by reciprocity, which we define as the share of reciprocated ties to all ties and, therefore, ranges between 0 and 1. Panel 3 reports the estimated impact of COVID-19 on reciprocal ties. Results align with previous findings, showing a large decline of 10 percentage points in reciprocal ties in students’ friendship networks due to COVID-19, translating into a 25%

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<sup>23</sup>The maximum value we observe is 17 for the friendship network, 12 for the AS Provided network, 11 for the AS Received network, 12 for the ES Provided network, and 13 for the ES Received network.

decline in terms of effect size. For both directions of the academic support networks, there was a small increase of approximately 2 percentage points in the ratio of reciprocal ties to all ties. However, when baseline levels of reciprocity are considered, the impact on academic support networks is comparable to that of friendship networks (around 20% in terms of effect size). No significant differences were observed for nominations in the provision of emotional support, but COVID-19 led to a 3 percentage points decrease in reciprocal ties for nominations from whom students receive emotional support, representing around a 14% decline in effect size.

Finally, Panel 4 introduces the estimated impact on the clustering coefficient, a network statistic measuring the well-connectedness of a node's (individual) direct neighbors as the share of neighbors that are connected between themselves to all neighbors. This measure varies between 0 and 1. Note that higher values of the clustering coefficient indicate a higher level of tightly-knit groups in classroom social networks. Tightly-knit groups in friendship networks witnessed a sharp decline of about 30% as a result of COVID-19. Clustering in academic support networks remained similar between pre-pandemic and pandemic cohorts, while the pandemic cohort witnessed a reduction of 15% and 24% in terms of the effect size for clustering in emotional support (provided) and emotional support (received), respectively.

In addition to the presented results, we conducted robustness checks by computing Romano-Wolf p-values (Clarke et al., 2020) to assess the validity of our findings under potential concerns of multiple hypothesis testing. The results of these tests support the robustness of our main findings, with the exception of the estimates related to the probability of isolation in the academic support (provided) network and in the emotional support (received) network, which do not satisfy conventional significance levels ( $p = 0.11$  and  $p = 0.27$ , respectively).

Overall, the experience of COVID-19 appears to have a differential impact on peer relationships depending on the nature of the relationship. While the negative impact on friendship networks points to a deterioration in peer relationships, the improvement observed for academic networks could be associated with the increased demand for peer relationships due to a decline in academic skills, as suggested in (Alan and Turkum, 2024). Further changes in the structure of classroom social networks, both in terms of the quality of students' relationships measured by reciprocity and the well-connectedness of a student's peers as measured by the clustering coefficient, highlight the diverse effects of the pandemic on peer dynamics.

## 5.2 Heterogeneities

In this subsection, we briefly examine heterogeneities in the impact of COVID-19 based on students' demographic characteristics.<sup>24</sup> We explore heterogeneities across students' gender, refugee status, and socio-economic status (SES).<sup>25</sup> Numerous prior studies (e.g., Smith (2011); Underwood (2004); Schwartz et al. (2021); Çiçekoğlu et al. (2019); Samara et al. (2020); Due et al. (2016); Bukowski et al. (2020); Bai et al. (2021); Risi et al. (2003); Cavicchiolo et al. (2022)) consistently suggest that these demographic factors significantly contribute to variations in peer relationships.

### 5.2.1 Heterogeneities based on refugee status

Table 4 highlights intriguing differences in the impact of COVID-19 between native and refugee students. In Panel 1, our findings reveals a substantial rise in the probability of experiencing social isolation within the friendship networks for both native and refugee students. Notably, refugees encountered a more pronounced increase, approximately 26%, compared to a 20% increase observed among native students.

While pooled results for academic support initially suggest a consistent decline in isolation, a closer examination reveals significant differences between native and refugee students. The decrease in the probability of being isolated in academic support (provided) is primarily driven by the decline among native students. In contrast, refugee students witnessed an increase of 9 percentage points, representing a 16% increment in effect size. For academic support (received) networks, both groups experienced a decline. However, there was a notable drop of 8 percentage points for native students, whereas the decline was insignificant (3 percentage points) for refugee students. This translates to a reduction in effect size of 20% for native students and 4% for refugee students, respectively. For emotional support networks, we observe null effects of the pandemic on the probability of isolation for both refugee and native students.

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<sup>24</sup>It is important to note that the observed differences should not be interpreted as causal effects, as they may be correlated with certain characteristics influencing students' social networks.

<sup>25</sup>In addition to our main analysis of heterogeneity outlined in this subsection, we further explore variations based on factors such as teacher demographics, teaching styles, teachers' characteristics as perceived by students, parenting styles, and socioeconomic status indicators. These additional analyses are detailed in the appendix A.4.

**Table 4:** Main Results by Refugee Status

	Friendship		AS Provided		AS Received		ES Provided		ES Received	
	(1) Native	(2) Refugee	(3) Native	(4) Refugee	(5) Native	(6) Refugee	(7) Native	(8) Refugee	(9) Native	(10) Refugee
<b>Panel 1: Isolates</b>										
COVID	0.04*** (0.01)	0.11*** (0.03)	-0.05*** (0.01)	0.09** (0.04)	-0.08*** (0.02)	-0.03 (0.03)	-0.01 (0.01)	0.02 (0.04)	0.01 (0.01)	0.05 (0.03)
Control Mean	0.18	0.44	0.33	0.55	0.41	0.70	0.27	0.57	0.26	0.56
Effect Size	0.20	0.26	-0.16	0.16	-0.20	-0.04	-0.05	0.04	0.06	0.10
p-Value (Native=Refugee)	0.04		0.00		0.13		0.35		0.28	
N	8490	1797	8490	1797	8490	1797	8490	1797	8490	1797
R-Squared	0.022	0.102	0.032	0.082	0.044	0.076	0.025	0.080	0.030	0.068
<b>Panel 2: In-degree ties</b>										
COVID	-0.33*** (0.04)	-0.48*** (0.10)	0.30*** (0.04)	-0.18** (0.08)	0.26*** (0.05)	0.01 (0.07)	0.14*** (0.04)	-0.08 (0.09)	-0.03 (0.04)	-0.09 (0.08)
Control Mean	2.43	1.16	1.27	0.73	1.23	0.49	1.66	0.74	1.75	0.69
Effect Size	-0.14	-0.41	0.24	-0.25	0.21	0.01	0.08	-0.10	-0.02	-0.13
p-Value (Native=Refugee)	0.18		0.00		0.00		0.02		0.47	
N	8490	1797	8490	1797	8490	1797	8490	1797	8490	1797
R-Squared	0.020	0.099	0.056	0.084	0.060	0.058	0.040	0.064	0.048	0.061
<b>Panel 3: Reciprocity</b>										
COVID	-0.09*** (0.01)	-0.12*** (0.02)	0.04*** (0.01)	-0.02 (0.02)	0.03*** (0.01)	0.01 (0.01)	0.01 (0.01)	-0.02 (0.02)	-0.03** (0.01)	-0.04* (0.02)
Control Mean	0.41	0.24	0.15	0.08	0.13	0.05	0.20	0.11	0.24	0.12
Effect Size	-0.22	-0.51	0.24	-0.24	0.21	0.18	0.03	-0.17	-0.12	-0.30
p-Value (Native=Refugee)	0.23		0.04		0.26		0.30		0.76	
N	8490	1797	8490	1797	8490	1797	8490	1797	8490	1797
R-Squared	0.046	0.110	0.041	0.083	0.048	0.050	0.039	0.088	0.053	0.113
<b>Panel 4: Clustering coef.</b>										
COVID	-0.10*** (0.01)	-0.13*** (0.02)	-0.00 (0.01)	-0.03** (0.01)	-0.00 (0.01)	-0.03* (0.01)	-0.03*** (0.01)	-0.04* (0.02)	-0.06*** (0.01)	-0.04* (0.02)
Control Mean	0.37	0.28	0.16	0.09	0.17	0.08	0.24	0.12	0.26	0.12
Effect Size	-0.27	-0.49	-0.00	-0.34	-0.02	-0.32	-0.13	-0.36	-0.23	-0.32
p-Value (Native=Refugee)	0.20		0.08		0.28		0.67		0.32	
N	8490	1797	8490	1797	8490	1797	8490	1797	8490	1797
R-Squared	0.068	0.124	0.049	0.085	0.048	0.073	0.040	0.081	0.054	0.076

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row, for the network type, and for the subgroup of the sample specified on top of columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

Moving to Panel 2 to examine the change in in-degree ties, our pooled results from the previous section indicated a substantial decline in friendship networks, which is corroborated here for both student groups. However, discrepancies between student groups persist, with the effect size notably larger for refugees, at 41%, compared to 14% for natives. On the other hand, the observed increase in the academic support networks in the pooled results

seems to be solely driven by native students. Significant differences emerge when comparing estimates for academic support provision, indicating an increase of 24% for the natives and a decline of 25% for the refugees. Similarly, for academic support receipt, our estimates differ significantly between natives and refugees, and as such the increase that we reported in the pooled results is driven by the natives (21% vs 1% increase). We document a similar pattern of significant difference in estimates between natives and refugees for the emotional support provision network as well, marking an increase of 8% for natives as well as a decline of 10% for refugees. These results further strengthen the argument for discrepancies based on refugee status, as the negative effects in friendship networks seem to be consistently larger for refugees, and the positive impact for academic support networks in the pooled results mask the actual negative results for refugees.

Panel 3 of Table 4 reports the results on the heterogeneous impact of COVID-19 on reciprocal ties for natives and refugees. While we report slight differences in estimates for most of the outcomes, we only detect a statistically significant difference in the estimates for academic support provision networks. The increase that we reported for pooled results turned out to be driven by native students, as we note an increase of about 24% for natives, while a similar level of change occurred for refugees in the opposite direction.

In panel 4, we explore differences across ethnic groups for the outcome of clustering. Similarly to our interpretation of findings for the outcome of reciprocity, we can only detect statistically significant differences in the estimates for the academic support provision network. Pooled results appear to hide the notable decline of 34% in clustering for refugees in this network, whereas there is no significant change for native students.

To sum up, we observe interesting differences in the impact of COVID-19 between native and refugee students; however, only some of these disparities yield statistically significant results at conventional levels. We argue that the deterioration in friendship networks is found to be stronger for refugee students. However, what stands out most is that the observed positive change in academic support networks, as reported in the pooled results, is entirely driven by the outcomes for native students. In contrast, we contend that the academic support networks of refugee students deteriorated, as evidenced by the increase in the likelihood of isolation, the decline in in-degree ties, and the diminished connectivity to other students. The evidence found here motivates a further investigation in the changing structure of peer relationships, by taking a look at inter-ethnic ties and classroom homophily in section 5.3.1.

### 5.2.2 Heterogeneities based on gender

We present the results from regressions conducted separately for male and female students in Table 5. The differences based on students' gender in the impact of COVID-19 are primarily in terms of the effect sizes rather than direction, in contrast to the results based on heterogeneity in refugee status.

In Panel 1 of Table 5, we report the differences between male and female students in the probability of being isolated. We observe noticeable differences for academic support networks; however, the disparity between the estimates is only significant for the academic support (received) network. This significant difference points to a larger decrease in the probability of being isolated for male students compared to female students (18% vs. 12%).

Moving to Panel 2 of Table 5 for the estimated impact of COVID-19 on in-degree ties, we note considerable differences between genders in the estimates for the friendship and academic support (provided) networks. The reported decline in the friendship network appears to be more pronounced for male students (20% vs. 12%), while the increase in academic support (provided) is significantly larger for female students compared to male students (23% vs. 14%). For the remaining outcomes, while we obtain slightly different point estimates in some cases, none of the differences in these estimates between male and female students turn out to be statistically significant.

In summary, our findings indicate that the overall impact of COVID-19 does not vary significantly across genders, in contrast to results based on refugee status. Notable distinctions emerge between genders within academic support networks. Male students exhibit a significantly greater reduction in the likelihood of isolation in academic support (received), a more modest increase in in-degree ties compared to females in academic support (provided). Additionally, a more pronounced decline in in-degree ties within friendship networks observed among males.

**Table 5: Main Results by Gender Status**

	Friendship		AS Provided		AS Received		ES Provided		ES Received	
	(1) Male	(2) Female	(3) Male	(4) Female	(5) Male	(6) Female	(7) Male	(8) Female	(9) Male	(10) Female
<b>Panel 1: Isolates</b>										
COVID	0.05*** (0.01)	0.05*** (0.01)	-0.04** (0.02)	-0.02 (0.02)	-0.10*** (0.02)	-0.05*** (0.02)	0.00 (0.02)	-0.01 (0.02)	0.01 (0.02)	0.03** (0.01)
Control Mean	0.25	0.20	0.41	0.32	0.53	0.39	0.36	0.29	0.37	0.25
Effect Size	0.22	0.23	-0.10	-0.06	-0.18	-0.12	0.00	-0.05	0.04	0.14
p-Value (Male = Female)	0.68		0.28		0.03		0.47		0.22	
N	5271	5016	5271	5016	5271	5016	5271	5016	5271	5016
R-Squared	0.082	0.108	0.058	0.074	0.070	0.096	0.077	0.094	0.074	0.109
<b>Panel 2: In-degree ties</b>										
COVID	-0.42*** (0.05)	-0.29*** (0.05)	0.15*** (0.05)	0.30*** (0.06)	0.23*** (0.05)	0.20*** (0.06)	0.06 (0.05)	0.13** (0.07)	-0.02 (0.05)	-0.07 (0.06)
Control Mean	2.15	2.30	1.05	1.32	0.85	1.37	1.30	1.73	1.30	1.87
Effect Size	-0.20	-0.12	0.14	0.23	0.27	0.14	0.04	0.08	-0.02	-0.04
p-Value (Male = Female)	0.04		0.02		0.60		0.33		0.46	
N	5271	5016	5271	5016	5271	5016	5271	5016	5271	5016
R-Squared	0.088	0.083	0.069	0.085	0.072	0.079	0.069	0.086	0.067	0.098
<b>Panel 3: Reciprocity</b>										
COVID	-0.09*** (0.01)	-0.10*** (0.01)	0.02** (0.01)	0.03* (0.02)	0.03*** (0.01)	0.02 (0.01)	0.01 (0.01)	-0.00 (0.02)	-0.01 (0.01)	-0.06*** (0.02)
Control Mean	0.35	0.41	0.11	0.16	0.08	0.15	0.15	0.22	0.16	0.28
Effect Size	-0.26	-0.24	0.19	0.18	0.38	0.10	0.05	-0.01	-0.03	-0.20
p-Value (Male = Female)	0.76		0.65		0.40		0.57		0.01	
N	5271	5016	5271	5016	5271	5016	5271	5016	5271	5016
R-Squared	0.081	0.089	0.042	0.053	0.040	0.055	0.041	0.060	0.043	0.078
<b>Panel 4: Clustering coef.</b>										
COVID	-0.12*** (0.02)	-0.10*** (0.01)	-0.01 (0.01)	0.00 (0.01)	-0.01 (0.01)	-0.00 (0.02)	-0.03*** (0.01)	-0.03*** (0.01)	-0.06*** (0.01)	-0.06*** (0.01)
Control Mean	0.34	0.37	0.13	0.17	0.12	0.18	0.19	0.25	0.21	0.27
Effect Size	-0.35	-0.26	-0.10	0.00	-0.08	-0.03	-0.17	-0.14	-0.28	-0.22
p-Value (Male = Female)	0.27		0.43		0.80		0.94		0.96	
N	5271	5016	5271	5016	5271	5016	5271	5016	5271	5016
R-Squared	0.098	0.082	0.059	0.058	0.053	0.065	0.058	0.067	0.071	0.078

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row, for the network type, and for the subgroup of the sample specified on top of columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

### 5.2.3 Heterogeneities based on SES

To examine district-level SES heterogeneity, we utilize SES variation in our sample, which includes five districts. Our approach involves a comparison between districts with the lowest and highest socio-economic development indices in our sample using the calculation of the Turkish Ministry of Industry and Technology (Acar et al., 2019).

**Table 6:** Main Results by SES

	Friendship		AS Provided		AS Received		ES Provided		ES Received	
	(1) Low	(2) High	(3) Low	(4) High	(5) Low	(6) High	(7) Low	(8) High	(9) Low	(10) High
<b>Panel 1: Isolates</b>										
COVID	0.08** (0.03)	0.03 (0.02)	0.01 (0.04)	-0.03 (0.03)	-0.08** (0.02)	-0.03 (0.03)	-0.01 (0.02)	-0.00 (0.04)	-0.01 (0.04)	0.02 (0.03)
Control Mean	0.25	0.22	0.39	0.37	0.49	0.44	0.37	0.30	0.38	0.31
Effect Size	0.33	0.14	0.02	-0.09	-0.17	-0.06	-0.01	-0.01	-0.04	0.07
p-Value (Low = High)	0.44		0.77		0.63		0.97		0.73	
N	1567	1349	1567	1349	1567	1349	1567	1349	1567	1349
R-Squared	0.104	0.103	0.093	0.058	0.101	0.108	0.124	0.090	0.112	0.109
<b>Panel 2: In-degree ties</b>										
COVID	-0.50*** (0.07)	-0.24* (0.12)	0.15 (0.10)	0.20 (0.11)	0.21* (0.10)	0.09 (0.09)	0.11 (0.10)	0.09 (0.12)	-0.03 (0.11)	-0.05 (0.11)
Control Mean	2.12	2.31	1.18	1.20	1.06	1.15	1.35	1.62	1.41	1.65
Effect Size	-0.24	-0.10	0.13	0.16	0.20	0.08	0.08	0.06	-0.02	-0.03
p-Value (Low = High)	0.27		0.88		0.82		0.90		0.96	
N	1567	1349	1567	1349	1567	1349	1567	1349	1567	1349
R-Squared	0.086	0.096	0.083	0.080	0.088	0.108	0.092	0.101	0.099	0.123
<b>Panel 3: Reciprocity</b>										
COVID	-0.10*** (0.02)	-0.11*** (0.02)	0.04* (0.02)	0.01 (0.03)	0.03 (0.02)	-0.01 (0.02)	0.00 (0.02)	0.00 (0.02)	-0.02 (0.02)	-0.06* (0.03)
Control Mean	0.35	0.41	0.11	0.15	0.09	0.13	0.14	0.19	0.16	0.25
Effect Size	-0.29	-0.28	0.36	0.10	0.32	-0.09	0.02	0.02	-0.10	-0.24
p-Value (Low = High)	0.88		0.81		0.69		0.99		0.72	
N	1567	1349	1567	1349	1567	1349	1567	1349	1567	1349
R-Squared	0.076	0.093	0.049	0.065	0.039	0.055	0.059	0.074	0.061	0.095
<b>Panel 4: Clustering coef.</b>										
COVID	-0.11*** (0.01)	-0.05 (0.03)	-0.01 (0.02)	-0.03 (0.03)	-0.02 (0.03)	0.02 (0.02)	-0.03 (0.02)	-0.01 (0.02)	-0.05** (0.02)	-0.02 (0.03)
Control Mean	0.32	0.34	0.15	0.16	0.14	0.14	0.19	0.22	0.20	0.22
Effect Size	-0.34	-0.14	-0.05	-0.18	-0.16	0.11	-0.14	-0.04	-0.26	-0.08
p-Value (Low = High)	0.60		0.83		0.75		0.59		0.47	
N	1567	1349	1567	1349	1567	1349	1567	1349	1567	1349
R-Squared	0.095	0.052	0.069	0.051	0.060	0.079	0.070	0.073	0.073	0.081

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row, for the network type, and for the subgroup of the sample specified on top of columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

Table 6 reports the results on heterogeneity in the impact of COVID-19 based on SES.<sup>26</sup> Unlike the differences we observed associated with gender and ethnicity differences, SES differences explain a lot less. While we report different point estimates for some cases, none of the differences turn out to be statistically significant, which may stem from the fact that we are only using a small subsample for the SES-based analysis.<sup>27</sup>

We still find it noteworthy to point out some differences, especially for the friendship network. Both in terms of probability of isolation and in-degree ties, students in the low-SES district appear to be worse off as a result of COVID-19. The probability of isolation increased by 33% among students in the low-SES district, compared to a 14% increase among students in the high-SES district. Similarly, there is a greater decline in the number of nominations received within the friendship network among students in the low-SES district compared to high-SES district (24% vs. 10%), albeit with no statistical significance between the difference in the estimates.

### 5.3 Results on inter-group relations

In this section, we explore peer relationships more deeply by investigating how inter-ethnic and inter-gender dynamics have shifted in response to COVID-19. We summarize inter-group relationships using Coleman’s homophily index for each subgroup of interest and explain the estimated changes in the index by examining shifts in nominations within and across these groups. Note that a higher value of excess homophily indicates a greater inclination to form within-group relationships, whereas a lower value indicates the opposite.<sup>28</sup>

#### 5.3.1 Results on inter-ethnic relations

Table 7 presents results regarding the influence of COVID-19 on inter-ethnic relations in classrooms. Columns 1 and 2 report the estimated changes from native students towards

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<sup>26</sup>This index of SES is calculated by the Turkish Ministry of Industry and Technology using variables categorized into seven groups: demographic variables (e.g., fertility), employment variables (e.g., the share of service sector employment), education variables (e.g., female literacy), health variables (e.g., the number of hospital beds), industry variables (e.g., agricultural production value per capita), financial variables (e.g., bank deposit amount per person), and social security variables (e.g., social welfare payments per person) with Principal Component Analysis (PCA).

<sup>27</sup>Detecting statistically significant findings becomes more challenging with small sample sizes.

<sup>28</sup>Figure A1 in the appendix provides network plots of two example classrooms that visualizes the contrast between low versus high ethnic segregation within a classroom.

refugee and native students, respectively. Columns 3 and 4 report the estimated changes from refugee students towards refugee and native students, respectively. Columns 5 and 6 summarize the estimated impact of COVID-19 on the excess homophily of native and refugee students, respectively.

We exclude several classrooms from the sample for this part of our analysis because Coleman’s Homophily Index is undefined for them. These classrooms fall into three categories: those with no refugees (33 classrooms), those with only one refugee (34 classrooms), or those with more than one refugee, but where all refugees were absent on the day of the classroom visit (11 classrooms).

In Panel 1, our estimates for students’ friendship networks underscore statistically and economically significant drops across each category of nominations, affirming our earlier findings on the deterioration of friendship relations. Specifically, focusing on nominations made by native students, COVID-19 led to a substantial decline in nominations towards both refugee and native students. While the coefficient estimate suggests a more substantial decrease in native-to-native nominations in absolute terms, the effect of COVID-19 on these nominations seems relatively moderate when taking baseline levels into account. Notably, there is a decline of 50% in the effect size for native-to-refugee nominations, contrasted with a 11% decline for native-to-native nominations. Consequently, we report 0.05 units increase in the excess homophily of native students, which lacks statistical significance. Similarly, COVID-19 led to a decrease in friendship nominations made by refugee students. We observe a decline of 44% for refugee-to-refugee nominations and a decrease of 22% for refugee-to-native nominations. The estimated impact on excess homophily for refugees confirms that the drop in within-group nominations is more pronounced than across-group nominations for refugees. Consequently, we report a decline of 0.2 units in the excess homophily index, which achieves statistical significance at the 10% level.

Panel 2 presents the results on students’ nominations to whom they provide academic support. As opposed to the decrease in nominations across all categories for friendship networks, we observe an increase in nominations towards natives and a decrease in nominations towards refugees. As a result, COVID-19 led to an increase in the excess homophily for natives by 0.11 units, while it resulted in a decrease of 0.33 units for refugees. The increase in native homophily is driven by the increase in native-to-native nominations of 27% in terms of the effect size, compared to a decline of 39% in native-to-refugee nominations. The investigation of nominations from refugees reveals interesting insights. The decline in refugee

**Table 7: Homophily based on Refugee Status**

	Native Nominations		Refugee Nominations		Homophily	
	(1) N $\Rightarrow$ R	(2) N $\Rightarrow$ N	(3) R $\Rightarrow$ R	(4) R $\Rightarrow$ N	(5) N	(6) R
<b>Panel 1: Friendship</b>						
COVID	-0.05** (0.02)	-0.26*** (0.05)	-0.30*** (0.06)	-0.19*** (0.07)	0.05 (0.03)	-0.20* (0.08)
Control Mean	0.09	2.26	0.69	0.88	0.75	-0.01
Effect Size	-0.50	-0.11	-0.44	-0.22		
N	6385	6385	1728	1728	267	259
<b>Panel 2: AS Provided</b>						
COVID	-0.03** (0.02)	0.32*** (0.05)	-0.04 (0.05)	0.14*** (0.05)	0.11* (0.04)	-0.33* (0.13)
Control Mean	0.08	1.20	0.33	0.36	0.61	0.08
Effect Size	-0.39	0.27	-0.13	0.40		
N	6385	6385	1728	1728	267	230
<b>Panel 3: AS Received</b>						
COVID	0.01 (0.01)	0.27*** (0.05)	-0.01 (0.04)	0.04 (0.05)	-0.03 (0.05)	-0.21* (0.09)
Control Mean	0.05	1.15	0.26	0.40	0.78	-0.05
Effect Size	0.16	0.24	-0.03	0.09		
N	6385	6385	1728	1728	267	226
<b>Panel 4: ES Provided</b>						
COVID	-0.00 (0.02)	0.13*** (0.05)	-0.04 (0.05)	0.08 (0.07)	0.00 (0.03)	-0.28*** (0.07)
Control Mean	0.07	1.57	0.37	0.47	0.71	0.05
Effect Size	-0.04	0.09	-0.11	0.16		
N	6385	6385	1728	1728	267	244
<b>Panel 5: ES Received</b>						
COVID	-0.01 (0.02)	0.01 (0.05)	-0.05 (0.06)	0.01 (0.05)	0.03 (0.04)	-0.22 (0.11)
Control Mean	0.06	1.65	0.36	0.50	0.75	0.01
Effect Size	-0.12	0.01	-0.15	0.02		
N	6385	6385	1728	1728	266	242

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network type at the beginning of the row and for the respective network measure specified at the top of the column. Columns 1-4 report native-to-refugee, native-to-native, refugee-to-refugee, and refugee-to-native nominations, respectively. Columns 5 and 6 report results on Coleman's Homophily index for natives and refugees, respectively. Results in columns 1-4 are based on fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Results in columns 5-6 are based on fully specified models that control for district-fixed effects, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level for the results in columns 1-4 and clustered at the district level for the results in columns 5-6. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

homophily is driven by both the drop in refugee-to-refugee nominations by 13%, though not statistically significant, and a significant 40% increase in refugee-to-native nominations.

In Panel 3, we present the estimated impact of COVID-19 on students' nominations from whom they receive academic support. The influence of COVID-19 appears to be less pronounced for this network, with the only statistically significant result observed in native-to-native nominations, witnessing a 24% increase in terms of the effect size. Despite this increase, the impact of COVID-19 on native homophily is slightly below zero, suggesting that the improvement (16%) in native-to-refugee nominations offsets the excess homophily stemming from the increase in native-to-native nominations (24%). On the other hand, COVID-19 led to a significant decline in refugee homophily score by 0.21 units, which is statistically significant at the 10% level. Although we do not detect notable changes in nominations made by refugees, the decline in refugee-to-refugee nominations combined with the increase in refugee-to-native nominations ultimately reduces the propensity of refugees to form ties amongst themselves.

In Panel 4 and 5, we present the estimated impact of COVID-19 on emotional support networks (provided and received). For both networks, while refugee homophily witnessed a sharp decline, COVID-19 led to negligible effects on native homophily. In most cases, results for emotional support networks fail to reach statistical significance, except in a few instances. We observe a 9% increase in native-to-native nominations when students are asked to nominate to whom they provide emotional support. Together with a slight decline in native-to-refugee nominations, COVID-19 causes a slight increase in native homophily for this network, albeit with no statistical significance. On the other hand, COVID-19 led to a sharp decline in refugee homophily due to fewer refugee-to-refugee nominations and higher refugee-to-native nominations.

Taken together, these results offer distinct insights into how inter-ethnic ties changed in response to COVID-19. Refugee students demonstrate a lower propensity to nominate their refugee peers in most cases, while native students appear to have a slightly higher propensity to nominate each other. In summary, our findings suggest that COVID-19 led to lower levels of ethnic segregation in classrooms, primarily driven by the tendency of refugee students to increase their nominations of native students or decreasing their nominations of refugee students at a higher rate than the decrease in their nominations of native students.

### 5.3.2 Results on inter-gender relations

Table 8 presents results regarding the influence of COVID-19 on inter-gender relations in classrooms. Columns 1 and 2 report the estimated changes from male students towards female and male students, respectively. Columns 3 and 4 report the estimated changes from female students towards female and male students, respectively. Columns 5 and 6 summarize the estimated impact of COVID-19 on the excess homophily of male students and female students, respectively.

In Panel 1 of Table 8, we report the estimated impact of COVID-19 on students' inter-gender nominations for their friendship networks. For both males and females, within-gender nomination decreased significantly as a response to COVID-19, with an effect size of 22% for males and 16% for females. These sharp declines are accompanied by increases in cross-gender nominations for both males and females, with an effect size of 29% for males and 8% increase for females, despite not reaching conventional statistical significance levels for female-to-male nominations. As a result, COVID-19 led to a statistically significant decrease in both male and female homophily, by 12% and 5% respectively.

We present our estimates of the impact of COVID-19 on students' inter-gender relations for academic support in Panel 2 and Panel 3 of Table 8. Our previous findings on positive impacts in academic support networks translate into higher levels of nominations both within and across genders. In Panel 2, we report our estimates for students' nominations to whom they provide academic support. The increase in nominations from males to both genders appears to be very similar (around 0.11-0.12). However, when baseline levels are taken into account, the estimated impact of COVID-19 on male-to-female nominations is more notable with an effect size of 55% than that of 14% for male-to-male nominations. These observed changes explain the estimated impact of COVID-19 on male homophily, which decreased by 21%. On the other hand, the increase in nominations from females appears to be more pronounced for female-to-female nominations by 0.17 compared to 0.03 for female-to-male nominations. Nevertheless, in terms of effect size, the increase is equal towards both females and males, at 16%. As a result, we detect a slight decline of 0.01 units in female homophily, which is not statistically significant.

In Panel 3, we report our estimates for students' nominations from whom they receive academic support. For this category of social network, the number of nominations from males to females increased by 31%, and from males to males increased by 23%. As a result,

**Table 8:** Homophily based on Gender Status

	Male Nominations		Female Nominations		Homophily	
	(1) M $\Rightarrow$ F	(2) M $\Rightarrow$ M	(3) F $\Rightarrow$ F	(4) F $\Rightarrow$ M	(5) M	(6) F
<b>Panel 1: Friendship</b>						
COVID	0.05*** (0.02)	-0.44*** (0.05)	-0.34*** (0.05)	0.01 (0.02)	-0.10*** (0.01)	-0.04** (0.01)
Control Mean	0.19	2.00	2.10	0.16	0.82	0.86
Effect Size	0.29	-0.22	-0.16	0.08		
N	5271	5271	5016	5016	344	345
<b>Panel 2: AS Provided</b>						
COVID	0.12*** (0.02)	0.11** (0.05)	0.17*** (0.05)	0.03* (0.02)	-0.12*** (0.02)	-0.01 (0.02)
Control Mean	0.22	0.84	1.08	0.22	0.57	0.68
Effect Size	0.55	0.14	0.16	0.16		
N	5271	5271	5016	5016	345	345
<b>Panel 3: AS Received</b>						
COVID	0.08*** (0.02)	0.16*** (0.04)	0.11** (0.05)	0.08*** (0.02)	-0.05 (0.05)	-0.09** (0.03)
Control Mean	0.26	0.71	1.10	0.15	0.45	0.77
Effect Size	0.31	0.23	0.10	0.53		
N	5271	5271	5016	5016	343	344
<b>Panel 4: ES Provided</b>						
COVID	0.15*** (0.02)	-0.02 (0.04)	-0.02 (0.05)	0.08*** (0.01)	-0.17*** (0.03)	-0.09** (0.02)
Control Mean	0.20	1.19	1.52	0.12	0.70	0.85
Effect Size	0.72	-0.01	-0.01	0.63		
N	5271	5271	5016	5016	345	344
<b>Panel 5: ES Received</b>						
COVID	0.10*** (0.02)	-0.09** (0.04)	-0.18*** (0.05)	0.07*** (0.02)	-0.14*** (0.02)	-0.09*** (0.02)
Control Mean	0.23	1.19	1.63	0.11	0.67	0.87
Effect Size	0.45	-0.08	-0.11	0.65		
N	5271	5271	5016	5016	344	344

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network type at the beginning of the row and for the respective network measure specified at the top of the column. Columns 1-4 report male-to-female, male-to-male, female-to-female, and female-to-male nominations, respectively. Columns 5 and 6 report results on Coleman's Homophily index for males and females, respectively. Results in columns 1-4 are based on fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Results in columns 5-6 are based on fully specified models that control for district-fixed effects, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level for the results in columns 1-4 and clustered at the district level for the results in columns 5-6. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

we detect a decline in the male homophily by 10%, but the estimate is not statistically significant. For the nominations from females, COVID-19 led to an increase for nominations towards both genders, 10% and 53% towards females and males respectively. As a result, we detect a decline of 12% in female homophily, which is statistically significant at 5% level.

Panel 4 presents our estimates on students' nominations to whom they provide emotional support. Although we observe small decreases in within-gender nominations, we fail to find significant changes, neither statistically nor economically. The estimates for cross-gender nominations, however, reveal a considerable increase of 72% for males-to-females and 63% for females-to-males nominations. Consequently, COVID-19 led to a decline in the propensity to nominate a student from their gender for both males and females, by 24% and 10%, respectively.

Panel 5 presents our findings on students' nominations from whom they receive emotional support. Similar to our previous findings, we observe an increase in cross-gender nominations, accompanied by significant drops in within-gender nominations. While male-to-female nominations increased by 45%, male-to-male nominations dropped by 8%. On the other hand, female-to-female nominations decreased by 11% and female-to-male nominations increased by 65%. As a result, homophily of both genders witnessed a statistically significant decline of 20% for males and 11% for females, as a response to COVID-19.

Our exploration into how students interact across genders reveals a positive trend amid the challenges posed by COVID-19. The noticeable decrease in gender-based homophily is mainly driven by an uptick in cross-gender nominations, while there are instances of reduced within-gender nominations. The overall increase in connections across genders signals a shift towards more inclusive peer relationships within classrooms in terms of gender.

## 5.4 Robustness Checks

In this section, we address potential concerns that might impact our estimates. A notable challenge in applied network analysis is the issue of missing data, wherein some ties may remain unobserved.<sup>29</sup>

In the context of our study, the source of missing data is student absenteeism. Students absent on the day of data collection could not nominate their peers for their social networks,

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<sup>29</sup>See [Kossinets \(2006\)](#) and [Chandrasekhar and Lewis \(2016\)](#) for more details.

eliminating our ability to observe their outgoing ties. Nevertheless, we can still observe the ties they received from present students.

A particular issue related to our study is the different levels of student absenteeism between the two cohorts we are investigating. Since we conducted our data collection on the post-pandemic cohort right after the schools were reopened, there were still many parents who were hesitant about sending their children to school (Zhan et al., 2022; Limbers, 2021; Hageman, 2020; Khattab et al., 2020). As such, we observe an increase in the share of students who were absent on the day of data collection in the pandemic cohort. We present detailed summary statistics on student absenteeism of our sample in the appendix (see Table B1). While the average absence rate was around 8.6% for the pre-pandemic cohort, strikingly it increased to about 20% for the post-pandemic cohort. We report similar changes in the increase of absenteeism for all genders and ethnicities in our sample.

To ensure the robustness of our results against potential biases from missing nominations, we conduct several checks. Firstly, we replicate our analyses for classrooms with lower absenteeism. Based on the distribution of classrooms in the sample, we generate a subsample of classrooms that have less than 40% absenteeism (which corresponds to the 80th percentile). This sample restriction leaves us with 281 classrooms. Results obtained from this subsample are reported in the appendix A.3.1.<sup>30</sup> Our results remain robust for this subsample of classrooms.

Secondly, we repeat our analyses based on induced subgraphs, which involve removing nominations for absent students. These subgraphs only include nominations between students present on the day of our visit. We report the results obtained from induced subgraphs in the appendix A.3.2.<sup>31</sup> Our findings remain robust to this approach as well.

## 6 Discussion of Mechanisms

In this section, we explore the potential mechanisms underlying our main findings. One key mechanism underlying one of our primary findings, namely the deterioration of peer relationships in the friendship network, characterized by increased social isolation and diminished in-degree ties and reciprocity, may stem from the adverse effects of the pandemic

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<sup>30</sup>See Tables B2, B3, B4, and B5.

<sup>31</sup>See Tables B6, B7, B8, and B9.

on children’s socio-cognitive and socio-emotional skills. To shed light on this, we draw upon previous research emphasizing the significant connection between social skills and peer interactions. Studies conducted by Peterson et al. (2016), Hughes and Leekam (2004), and Caputi et al. (2012) have highlighted the importance of cognitive empathy (Theory of mind), as measured by the Reading the Mind in the Eyes (RME) test (Baron-Cohen et al., 2001), in shaping peer relationships. They found that higher levels of cognitive empathy are associated with greater social competence and improved friendship quality. Furthermore, research by Portt et al. (2020), Van der Graaff et al. (2014), and Van der Graaff et al. (2018) provides empirical evidence supporting the link between emotional empathy and peer relationships, underscoring the vital role of emotional empathy in fostering positive connections with peers. Additionally, a study by Bagwell et al. (2001), exploring the influence of impulsivity on peer interactions, reveals that children with higher levels of impulsivity are more likely to face peer rejection. Likewise, according to Parker et al. (2015), patience, which is a facet of self-regulation (opposite of impulsivity), can play a role in fostering more favorable peer relationships. These existing studies provide a strong foundation for our hypothesis that the pandemic-induced deterioration of sociocognitive and socioemotional skills could be a significant factor contributing to the observed decline in peer relationships in friendship network.

Our data is rich enough to test above associations in our context. In Panel 1 of Table 9, consistent with the literature, we find cognitive empathy and emotional empathy are negatively correlated with social isolation and positively correlated with the number of in-degree ties and reciprocity. We also document that impulsivity is associated with an increase in isolation and a decrease in in-degree ties and reciprocity. Column 1 of Table 10 gives evidence of the erosion of these skills due to the pandemic in our data. We document 0.05 standard deviation (SD) lower cognitive empathy, 0.40 SD lower emotional empathy, and 0.28 SD higher impulsivity.<sup>32</sup> These results, combined with the existing literature on the role of these skills in shaping social relationships, suggest that the deterioration in friendship network may be partially driven by the decline in sociocognitive and socioemotional skills.

In addition to the aforementioned findings, Panel 1 of Table 9 reveals that the clustering coefficient exhibits a positive correlation with cognitive empathy and emotional empathy, while displaying a negative correlation with impulsivity. Consequently, these outcomes may

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<sup>32</sup>While the estimates for cognitive empathy and impulsivity are statistically significant even at a 1% level, the estimate for cognitive empathy does not reach the statistical significance.

**Table 9:** Associations between Social Network Measures and Socio-emotional Skills

	(1)	(2)	(3)	(4)
	Isolate	In-degree Ties	Reciprocity	Clustering coef.
<b>Panel 1: Friendship</b>				
Cognitive Empathy	-0.045*** (0.01)	0.327*** (0.03)	0.048*** (0.01)	0.017*** (0.01)
Emotional Empathy	-0.021*** (0.01)	0.188*** (0.02)	0.026*** (0.00)	0.013*** (0.00)
Impulsivity	0.023*** (0.00)	-0.189*** (0.02)	-0.028*** (0.00)	-0.018*** (0.00)
N	7616	7616	7616	7616
R-Squared	0.067	0.098	0.074	0.048
<b>Panel 2: AS Provided</b>				
Cognitive Empathy	-0.023*** (0.01)	0.109*** (0.02)	0.018*** (0.00)	0.015** (0.01)
Emotional Empathy	-0.018*** (0.01)	0.089*** (0.02)	0.014*** (0.00)	0.004 (0.00)
Impulsivity	0.020*** (0.01)	-0.085*** (0.02)	-0.011*** (0.00)	-0.014*** (0.00)
N	7616	7616	7616	7616
R-Squared	0.047	0.066	0.040	0.056
<b>Panel 3: AS Received</b>				
Cognitive Empathy	-0.070*** (0.01)	0.267*** (0.03)	0.032*** (0.01)	0.018*** (0.00)
Emotional Empathy	-0.018** (0.01)	0.130*** (0.02)	0.014*** (0.00)	0.006 (0.00)
Impulsivity	0.046*** (0.01)	-0.186*** (0.02)	-0.014*** (0.00)	-0.013*** (0.00)
N	7616	7616	7616	7616
R-Squared	0.085	0.108	0.054	0.053

Note: Each cell reports the OLS estimates of the association between socio-emotional skills and network measures specified at the top of the column for the respective network typed specified at the beginning of the row. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

suggest that the reduction observed in the clustering coefficient within the friendship network, as depicted in Table 3, might be influenced to some extent by changes in these skills associated with the pandemic, as described in Table 10: a reduction in cognitive empathy and emotional empathy, alongside an increase in impulsivity.<sup>33</sup>

<sup>33</sup>Likewise, the change in these skills may also contribute to the observed decrease in the clustering coefficient within the emotional support network. Table 3 indicates that besides the negative impact of COVID-19 on the clustering coefficient in the emotional support network, we do not observe a consistent

**Table 10:** Impact of COVID-19 on Socio-cognitive and Socio-emotional Skills

	(1)	(2)	(3)	(4)	(5)
	Pooled	Natives	Refugees	Males	Females
<b>Panel 1: Cognitive Empathy</b>					
COVID	-0.052 (0.04)	-0.034 (0.04)	-0.128 (0.09)	-0.052 (0.05)	-0.049 (0.04)
Control Mean	0.00	0.11	-0.64	0.12	-0.12
p-Value (Native = Refugee)		0.33			
p-Value (Male = Female)				0.94	
N	8762	7552	1210	4300	4462
R-Squared	0.160	0.113	0.090	0.172	0.135
<b>Panel 2: Emotional Empathy</b>					
COVID	-0.394*** (0.04)	-0.381*** (0.03)	-0.461*** (0.10)	-0.442*** (0.05)	-0.345*** (0.04)
Control Mean	0.00	0.06	-0.41	0.16	-0.16
p-Value (Native = Refugee)		0.48			
p-Value (Male = Female)				0.05	
N	8146	7137	1009	4012	4134
R-Squared	0.106	0.084	0.159	0.117	0.079
<b>Panel 3: Impulsivity</b>					
COVID	0.264*** (0.03)	0.264*** (0.03)	0.269*** (0.07)	0.245*** (0.04)	0.281*** (0.04)
Control Mean	0.00	-0.08	0.53	-0.14	0.14
p-Value (Native = Refugee)		0.96			
p-Value (Male = Female)				0.51	
N	7779	6817	962	3820	3959
R-Squared	0.099	0.070	0.139	0.103	0.078

Note: Each cell reports the OLS estimates of the effect of COVID-19 on outcomes that are specified at the beginning of the row for the samples that are given at the top of the columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

In the academic support networks, we observe an overall improvement after the pandemic in Table 3. However, when comparing the academic outcomes (math and verbal test scores) of the pre-pandemic and pandemic cohorts, it becomes evident that the pandemic cohort has incurred academic losses, amounting to 0.24 SD in math scores and 0.15 SD in verbal scores, as illustrated in the first column of Table 11.<sup>34</sup>

effect of COVID-19 on the emotional support network.

<sup>34</sup>For this analysis, the academic outcomes of pre-pandemic and pandemic cohorts are compared at the beginning of the respective academic year (2018-2019 academic year vs 2021-2022 academic year).

**Table 11:** Impact of COVID-19 on Academic Outcomes

	(1)	(2)	(3)
	Pooled Sample	Natives	Refugees
<b>Panel 1: Math scores</b>			
COVID	-0.24*** (0.03)	-0.25*** (0.04)	-0.13 (0.08)
Control Mean	-0.00	0.10	-0.57
p-Value (Native = Refugee)		0.27	
N	8762	7552	1210
R-Squared	0.26	0.25	0.17
<b>Panel 2: Verbal scores</b>			
COVID	-0.15*** (0.03)	-0.18*** (0.03)	0.05 (0.07)
Control Mean	-0.00	0.12	-0.74
p-Value (Native = Refugee)		0.03	
N	8762	7552	1210
R-Squared	0.22	0.18	0.13

Note: Each cell reports the OLS estimates of the effect of COVID-19 on outcomes that are specified at the beginning of the row for the samples that are given at the top of the columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

One plausible explanation for the pandemic cohort’s heightened engagement in academic support network formation could be their endeavor to offset the academic setbacks they experienced. Table 12 presents the academic recovery observed in the pandemic cohort, where we trace these students’ academic outcomes from the beginning to the end of the 2021-2022 academic year<sup>35</sup> and observe that the academic losses due to COVID-19 are partly recovered after approximately one (academic) year of schooling, with an increase of 0.41 SD in math score and 0.38 SD in verbal score.<sup>36</sup> Notably, the recovery in academic achievement is significantly more pronounced for students who receive academic support at the beginning of the 2021-2022 academic year, as shown by Column 4 of Table 12. These findings may

<sup>35</sup>It is important to reiterate that our data comprises social network outcomes exclusively for the beginning of the 2021-2022 academic year and not for the end of the 2021-2022 academic year.

<sup>36</sup>In this context, we employ the pandemic as a “natural experiment” to examine the impact of peer relationships on academic performance. It is important to emphasize that our focus here pertains not to the losses attributable to the pandemic but rather to the observed recovery that transpired after eight months of schooling subsequent to the pandemic. For the analysis of academic losses caused by the pandemic, please refer to Alan and Turkum (2024).

suggest that the pandemic cohort invested more effort in establishing academic support networks to alleviate the academic setbacks caused by the pandemic. Indeed, their active engagement in forming academic support networks paid off, leading to a reduction in the academic losses experienced, particularly for those who were not isolated within the academic support (received) network.

**Table 12:** Associations between Networks and Academic Recovery

	Friendship			AS Received	
	(1)	(2)	(3)	(4)	(5)
	All	Non-Isolated	Isolated	Non-Isolated	Isolated
<b>Panel 1: Math scores</b>					
Recovery	0.41*** (0.02)	0.44*** (0.03)	0.36*** (0.04)	0.44*** (0.03)	0.37*** (0.03)
Control Mean	0.00	0.08	-0.41	0.12	-0.30
p-Value (Isolated = Non-isolated)		0.07		0.02	
N	7079	5760	1319	4924	2155
R-Squared	0.25	0.24	0.29	0.27	0.26
<b>Panel 2: Verbal scores</b>					
Recovery	0.38*** (0.02)	0.42*** (0.02)	0.26*** (0.04)	0.41*** (0.02)	0.33*** (0.03)
Control Mean	0.00	0.08	-0.39	0.13	-0.33
p-Value (Isolated = Non-isolated)		0.00		0.02	
N	7079	5760	1319	4924	2155
R-Squared	0.21	0.21	0.22	0.21	0.23

Note: Each cell reports the OLS estimates of the effect of COVID-19 on outcomes that are specified at the beginning of the row for the samples that are given at the top of the columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

In terms of the heterogeneous effects of the pandemic, we do not know enough to pin down the exact underlying mechanism, however, we can offer some potential explanations. In Table 4, an overall deterioration in peer relationships is evident for refugee students when examining isolation, in-degree ties, and reciprocity. In addition to the exacerbated deterioration in the friendship network compared to native students, refugee students also experience a decline in the academic support network, which contrasts with the situation for native students. One possible explanation for these observed heterogeneities could be associated with the socioeconomic status of refugee households. Table D2 in the appendix

shows statistically significant differences between native and refugee students in some SES indicators (such as the number of siblings, parental employment status, and access to a computer at home). The analysis of heterogeneity regarding the pandemic’s impact, based on these variables, is detailed in Table C5 in the appendix. While we do not observe an overall consistent heterogeneous effect of these variables on the pandemic’s effect on classroom peer relationships, we do identify some statistically significant correlations. For example, within the friendship network, having a working mother is associated with increased reciprocity. In the academic support network, a higher number of siblings correlates with a higher likelihood of isolation (in academic support provision), lower in-degree ties, and reduced reciprocity.<sup>37</sup> Additionally, possessing a computer at home is associated with increased in-degree ties within the academic support networks. Given that refugee students typically have more siblings and a lower likelihood of having a working mother or computer at home compared to native students, these factors may explain some of the disparities in the pandemic’s effects on the classroom social networks of native and refugee students.

Another potential explanation for the observed heterogeneity based on refugee status may be linked to the parenting styles adopted by refugee parents. Table D2 in the appendix reveals statistically significant differences between native and refugee students in various parenting styles to which they were exposed, including obedience, warmth, punishment, and reasoning. Furthermore, Table C4 in the appendix shows some statistically significant associations of these parenting styles on the pandemic’s impact on classroom peer relationships.<sup>38</sup>

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<sup>37</sup>The differences observed in the context of the number of siblings may be partly attributed to children with more siblings experiencing reduced parental attention during the pandemic compared to those with fewer siblings. Our analysis of parenting styles highlights some roles that parental input plays during the pandemic. As students spent an increased amount of time at home, their exposure to parents significantly intensified compared to the pre-pandemic period. In some instances, parents even took on roles typically fulfilled by teachers. Consequently, parents played a central role in the pandemic’s impact on students. However, when parents must divide their time and attention among multiple children, they may not be as effective in compensating for the adverse effects of the pandemic on their children. Additionally, the necessity to share technological devices, such as computers or tablets, with their siblings for online education could have strained resources and access to educational tools further. This device-sharing may have resulted in less personalized learning experiences and potentially affected communication with peers and social development during this challenging period.

<sup>38</sup>While the specific mechanisms underlying the heterogeneity in the pandemic effects based on parenting styles and SES indicators remain unclear, we can propose some potential explanations for the observed disparities. Firstly, low-income households may face difficulties accessing essential devices like computers and tablets needed for virtual communication. This lack of access can make it challenging for them to maintain social connections with friends during school closures. Moreover, students with an unemployed father may experience financial stress, contributing to increased anxiety and depression among these children, which could negatively affect their social relationship development. Furthermore, students from low-income or marginalized communities may have been disproportionately impacted by the shock of COVID-19, partly

For instance, higher parental reasoning is associated with reduced isolation in the friendship network, while increased parental warmth correlates with higher in-degree ties in the academic support (provided) network. Conversely, higher levels of parental punishment are linked to lower reciprocity in the academic support network. As refugee students' parents tend to exhibit poorer parenting styles compared to those of native students, these factors may contribute to the observed differences in how the pandemic impacts the classroom social networks based on refugee status.

Regarding gender-based heterogeneity, we do not observe an overall distinct variation in the effect of the pandemic on peer relationships. However, we find that male students experience a greater increase in isolation within the academic support (received) network. Additionally, concerning in-degree ties, males exhibit poorer outcomes compared to females in both the friendship and academic support (provided) networks. To explore the underlying mechanism behind these results, we examine how the pandemic impacted the socio-emotional and socio-cognitive skills of male and female students, as detailed in column 4 and 5 of Table 10. Our analysis does not unveil statistically significant differences in skill changes between genders regarding cognitive empathy and impulsivity. However, we do observe that the decline in emotional empathy is notably more drastic for males compared to females (0.45 SD vs. 0.36 SD). This discrepancy may contribute to the aforementioned gender heterogeneity observed in the pandemic's impact on peer relationships, as outlined in Table 5. Additionally, these gender differences in the pandemic's effects may be partly explained by existing survey evidence, which suggests that boys spent more time engaging in detrimental activities such as playing computer games or watching TV than girls during the pandemic (Grewenig et al., 2021). The excessive exposure to these activities may have limited their engagement in social life, leading to a further decline in their social skills.<sup>39</sup> However, it is important to emphasize that due to data limitations, we are unable to empirically investigate this channel. Therefore, we can only suggestively propose these mechanisms.<sup>40</sup>

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due to a lack of adult supervision and mentoring at home. In such cases, parents within this demographic may lack the necessary parenting styles to support their children's social development and mitigate the adverse impact of the pandemic.

<sup>39</sup>Lastly, traditional gender norms may discourage boys from expressing their emotions and dealing with stress related to the pandemic. These might lead them to become more isolated. These setbacks in social skill development can make it harder for them to form healthy peer relationships once in-person education resumes, given the cumulative nature of social skill development.

<sup>40</sup>In terms of SES-based (district) heterogeneity, we do not find a statistically significant differentiation in the impact of the pandemic on peer relationships; however, this could be due to the decreased statistical power resulting from small sample sizes.

## 7 Conclusion

In this study, we examine the impact of the COVID-19 pandemic on peer relationships within the classroom setting. Our investigation is motivated by the recognition of the critical role that peer interactions play in children’s development. We find compelling evidence indicating substantial changes in peer relationships following the pandemic. Specifically, we observe a significant deterioration in the friendship network and a notable increase in academic support among peers. These findings underscore the complex nature of peer relationships and their vulnerability to external shocks.

Furthermore, our analysis of heterogeneity reveals distinct patterns in the impact of the pandemic across different student demographics, particularly evident in the experiences of refugees and native students. We observe a pronounced worsening in the friendship networks of refugee students compared to their native counterparts. Additionally, our analysis unveils a decline in the academic support network among refugee students, contrasting with the situation among native students. Understanding these distinctions between refugee and native students is crucial for developing targeted interventions to support vulnerable student populations.

In the latter phase of our analysis, we document significant shifts in inter-group dynamics. Our results indicate a reduction in ethnic segregation, primarily driven by a decreased likelihood of refugees nominating other refugees. Additionally, we observe a decline in gender-based segregation within classrooms, attributed to both males and females demonstrating an increased inclination to nominate peers of the opposite gender.

Importantly, our study fills a significant gap in the existing literature by shedding light on the understudied topic of how the pandemic affects peer interactions in educational settings. By providing empirical evidence on this relationship, we contribute to both the literature on the impact of COVID-19 on children and the broader field of social network analysis. Moreover, our findings underscore the vital role of onsite education and peer interaction in fostering children’s skill development, echoing previous research highlighting the significance of social interactions in educational contexts. Initially, our study reveals a significant decline in crucial socio-emotional and cognitive skills among the pandemic cohort. Subsequently, we show that detrimental impacts of COVID-19 shock on academic outcomes are more striking and persistent for isolated students within the friendship network compared to students having healthier peer relationships, as presented in Table 12. Specifically, we demonstrate that

the recovery in academic outcomes following approximately one year of school attendance is lower for isolated students than for those who are not isolated. This suggests that isolated students derive less benefit from the stimulating classroom environment, further emphasizing the critical role of peer relationships in academic success.

Overall, our study highlights the importance of considering social skill development in educational policymaking, particularly in the context of mitigating the potential long-lasting effects of the COVID-19 pandemic on affected cohorts. By raising awareness of these issues, we aim to inform policymakers and educators in their efforts to support students' development in the post-pandemic era.

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## A Appendix

### A.1 Summary statistics of Social Network Measures

**Table A1:** Summary Statistics for Network: Friendship

	(1)	(2)	(3)	(4)
	Mean	SD	Min	Max
Isolate	0.254	0.435	0	1
In-degree ties	2.034	1.969	0	17
Reciprocity	0.331	0.370	0	1
Clustering coef.	0.302	0.315	0	1
Out-degree ties (native-to-native)	1.741	1.296	0	3
Out-degree ties (native-to-refugee)	0.065	0.276	0	3
Out-degree ties (refugee-to-refugee)	0.099	0.422	0	3
Out-degree ties (refugee-to-native)	0.129	0.516	0	3
Out-degree ties (male-to-male)	0.904	1.226	0	3
Out-degree ties (male-to-female)	0.108	0.387	0	3
Out-degree ties (female-to-female)	0.942	1.264	0	3
Out-degree ties (female-to-male)	0.081	0.330	0	3
Coleman's Excess Homophily Index (Natives)	0.772	0.267	-1	1
Coleman's Excess Homophily Index (Refugees)	-0.083	0.650	-1	1
Coleman's Excess Homophily Index (Males)	0.770	0.189	-0	1
Coleman's Excess Homophily Index (Females)	0.838	0.156	0	1

Note: This table reports summary statistics of social network measures constructed based on students' self-reported nominations regarding friendships.

**Table A2:** Summary Statistics for Network: AS Provided

	(1)	(2)	(3)	(4)
	Mean	SD	Min	Max
Isolate	0.352	0.478	0	1
In-degree ties	1.296	1.375	0	12
Reciprocity	0.152	0.297	0	1
Clustering coef.	0.148	0.259	0	1
Out-degree ties (native-to-native)	1.108	1.225	0	3
Out-degree ties (native-to-refugee)	0.060	0.280	0	3
Out-degree ties (refugee-to-refugee)	0.059	0.317	0	3
Out-degree ties (refugee-to-native)	0.070	0.378	0	3
Out-degree ties (male-to-male)	0.463	0.894	0	3
Out-degree ties (male-to-female)	0.144	0.463	0	3
Out-degree ties (female-to-female)	0.576	0.996	0	3
Out-degree ties (female-to-male)	0.114	0.393	0	3
Coleman's Excess Homophily Index (Natives)	0.667	0.333	-1	1
Coleman's Excess Homophily Index (Refugees)	-0.053	0.753	-1	1
Coleman's Excess Homophily Index (Males)	0.512	0.323	-1	1
Coleman's Excess Homophily Index (Females)	0.674	0.237	-0	1

Note: This table reports summary statistics of social network measures constructed based on students' self-reported nominations regarding to whom they provide academic support.

**Table A3:** Summary Statistics for Network: AS Received

	(1)	(2)	(3)	(4)
	Mean	SD	Min	Max
Isolate	0.426	0.494	0	1
In-degree ties	1.213	1.516	0	11
Reciprocity	0.128	0.281	0	1
Clustering coef.	0.151	0.269	0	1
Out-degree ties (native-to-native)	1.050	1.215	0	3
Out-degree ties (native-to-refugee)	0.042	0.216	0	3
Out-degree ties (refugee-to-refugee)	0.049	0.279	0	3
Out-degree ties (refugee-to-native)	0.073	0.376	0	3
Out-degree ties (male-to-male)	0.407	0.834	0	3
Out-degree ties (male-to-female)	0.153	0.486	0	3
Out-degree ties (female-to-female)	0.563	0.996	0	3
Out-degree ties (female-to-male)	0.090	0.350	0	3
Coleman's Excess Homophily Index (Natives)	0.768	0.308	-1	1
Coleman's Excess Homophily Index (Refugees)	-0.131	0.729	-1	1
Coleman's Excess Homophily Index (Males)	0.431	0.365	-1	1
Coleman's Excess Homophily Index (Females)	0.726	0.245	-1	1

Note: This table reports summary statistics of social network measures constructed based on students' self-reported nominations regarding from whom they receive academic support.

**Table A4:** Summary Statistics for Network: ES Provided

	(1)	(2)	(3)	(4)
	Mean	SD	Min	Max
Isolate	0.320	0.467	0	1
In-degree ties	1.553	1.620	0	12
Reciprocity	0.189	0.315	0	1
Clustering coef.	0.205	0.286	0	1
Out-degree ties (native-to-native)	1.346	1.271	0	3
Out-degree ties (native-to-refugee)	0.059	0.262	0	3
Out-degree ties (refugee-to-refugee)	0.064	0.329	0	3
Out-degree ties (refugee-to-native)	0.085	0.413	0	3
Out-degree ties (male-to-male)	0.606	1.021	0	3
Out-degree ties (male-to-female)	0.136	0.459	0	3
Out-degree ties (female-to-female)	0.734	1.129	0	3
Out-degree ties (female-to-male)	0.078	0.328	0	3
Coleman's Excess Homophily Index (Natives)	0.723	0.306	-1	1
Coleman's Excess Homophily Index (Refugees)	-0.071	0.717	-1	1
Coleman's Excess Homophily Index (Males)	0.618	0.274	-0	1
Coleman's Excess Homophily Index (Females)	0.803	0.193	-0	1

Note: This table reports summary statistics of social network measures constructed based on students' self-reported nominations regarding to whom they provide emotional support.

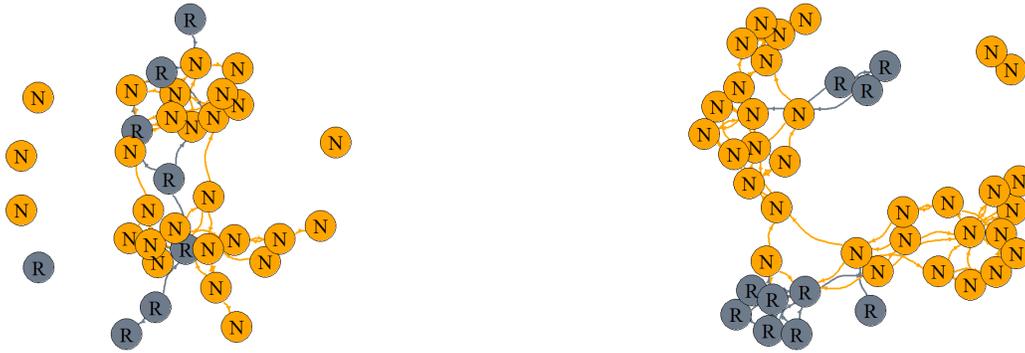
**Table A5:** Summary Statistics for Network: ES Received

	(1)	(2)	(3)	(4)
	Mean	SD	Min	Max
Isolate	0.326	0.469	0	1
In-degree ties	1.548	1.654	0	13
Reciprocity	0.203	0.327	0	1
Clustering coef.	0.207	0.291	0	1
Out-degree ties (native-to-native)	1.351	1.269	0	3
Out-degree ties (native-to-refugee)	0.051	0.243	0	3
Out-degree ties (refugee-to-refugee)	0.062	0.314	0	3
Out-degree ties (refugee-to-native)	0.085	0.413	0	3
Out-degree ties (male-to-male)	0.588	0.998	0	3
Out-degree ties (male-to-female)	0.139	0.461	0	3
Out-degree ties (female-to-female)	0.749	1.143	0	3
Out-degree ties (female-to-male)	0.071	0.315	0	3
Coleman's Excess Homophily Index (Natives)	0.774	0.269	-0	1
Coleman's Excess Homophily Index (Refugees)	-0.073	0.703	-1	1
Coleman's Excess Homophily Index (Males)	0.604	0.287	-1	1
Coleman's Excess Homophily Index (Females)	0.822	0.174	0	1

Note: This table reports summary statistics of social network measures constructed based on students' self-reported nominations regarding from whom they receive emotional support.

## A.2 Classroom Network Visualization

**Figure A1:** Ethnic Segregation in Classrooms



(a) Classroom with Low Ethnic Segregation

(b) Classroom with High Ethnic Segregation

Figure A1 shows the friendship network in two separate classrooms, highlighting the ethnic segregation in these classes. Letters N and R describe whether the student is a native or a refugee. The classroom network on the left is an example of a classroom with a relatively low level of ethnic segregation. For this classroom on the left panel, the Coleman Index for native students is 0.15, and the Coleman Index for refugee students is 0.03. The classroom network on the right panel is an example of a classroom with a relatively high level of ethnic segregation. For this classroom on the right panel, the Coleman Index for native students is 0.82, and the Coleman Index for refugee students is 0.74.

### A.3 Robustness checks

**Table B1:** Balance of Absence Rates

	(1)	(2)	(3)	(4)	(5)
	Mean of 2018	Difference	Effect Size	p-value	N
Absence rate	0.086	0.115	1.337	0.000	345
Absence rate of native students	0.063	0.089	1.413	0.000	345
Absence rate of refugee students	0.193	0.211	1.093	0.006	312
Absence rate of male students	0.082	0.131	1.598	0.000	345
Absence rate of female students	0.088	0.097	1.102	0.001	345

Note: A student is considered absent if they were not present on the day of our classroom visit. Differences are calculated by subtracting the mean of 2018 from the mean of 2021. Effect size is the ratio of the calculated difference to mean of 2018. Associated p-values are obtained by regressing the outcome variable on a dummy variable, which takes 0 for natives and 1 for refugees, controlling for school fixed effects.

#### A.3.1 Results on classrooms with lower absenteeism

**Table B2: Main Results**

	(1)	(2)	(3)	(4)	(5)
	Friendship	AS Provided	AS Received	ES Provided	ES Received
<b>Panel 1: Isolates</b>					
COVID	0.05*** (0.01)	-0.04** (0.02)	-0.07*** (0.02)	-0.00 (0.01)	0.03** (0.01)
Control Mean	0.21	0.37	0.45	0.30	0.29
Effect Size	0.23	-0.11	-0.16	-0.00	0.11
N	8383	8383	8383	8383	8383
R-Squared	0.09	0.07	0.09	0.08	0.09
<b>Panel 2: In-degree ties</b>					
COVID	-0.33*** (0.05)	0.24*** (0.05)	0.22*** (0.05)	0.10** (0.05)	-0.06 (0.05)
Control Mean	2.26	1.20	1.13	1.55	1.63
Effect Size	-0.15	0.20	0.20	0.07	-0.04
N	8383	8383	8383	8383	8383
R-Squared	0.08	0.08	0.09	0.08	0.10
<b>Panel 3: Reciprocity</b>					
COVID	-0.10*** (0.01)	0.02 (0.01)	0.02* (0.01)	0.00 (0.01)	-0.04*** (0.01)
Control Mean	0.39	0.15	0.12	0.19	0.23
Effect Size	-0.25	0.13	0.15	0.01	-0.17
N	8383	8383	8383	8383	8383
R-Squared	0.08	0.04	0.05	0.05	0.07
<b>Panel 4: Clustering coef.</b>					
COVID	-0.11*** (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.03*** (0.01)	-0.06*** (0.01)
Control Mean	0.36	0.15	0.15	0.22	0.24
Effect Size	-0.30	-0.07	-0.05	-0.15	-0.26
N	8383	8383	8383	8383	8383
R-Squared	0.08	0.06	0.06	0.05	0.07

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row and for the network type specified on top of columns. The sample is restricted to classrooms with less than 40% absence on the day of the classroom visit. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

**Table B3: Main Results by Refugee Status**

	Friendship		AS Provided		AS Received		ES Provided		ES Received	
	(1) Native	(2) Refugee	(3) Native	(4) Refugee	(5) Native	(6) Refugee	(7) Native	(8) Refugee	(9) Native	(10) Refugee
<b>Panel 1: Isolates</b>										
COVID	0.04*** (0.01)	0.12*** (0.04)	-0.05*** (0.02)	0.07 (0.05)	-0.08*** (0.02)	-0.03 (0.04)	-0.01 (0.01)	0.03 (0.04)	0.03** (0.01)	0.07 (0.04)
Control Mean	0.18	0.44	0.33	0.56	0.41	0.71	0.26	0.56	0.25	0.56
Effect Size	0.21	0.28	-0.16	0.12	-0.19	-0.04	-0.02	0.05	0.11	0.13
p-Value (Native=Refugee)	0.11		0.10		0.34		0.55		0.50	
N	7102	1281	7102	1281	7102	1281	7102	1281	7102	1281
R-Squared	0.022	0.105	0.035	0.088	0.046	0.078	0.023	0.079	0.031	0.078
<b>Panel 2: In-degree ties</b>										
COVID	-0.32*** (0.05)	-0.43*** (0.12)	0.30*** (0.05)	-0.14 (0.10)	0.25*** (0.05)	0.01 (0.08)	0.14*** (0.05)	-0.10 (0.11)	-0.05 (0.05)	-0.15 (0.10)
Control Mean	2.46	1.12	1.28	0.70	1.24	0.47	1.69	0.75	1.79	0.71
Effect Size	-0.13	-0.39	0.23	-0.20	0.20	0.02	0.08	-0.13	-0.03	-0.20
p-Value (Native=Refugee)	0.36		0.00		0.01		0.05		0.47	
N	7102	1281	7102	1281	7102	1281	7102	1281	7102	1281
R-Squared	0.020	0.108	0.058	0.100	0.062	0.067	0.040	0.075	0.047	0.073
<b>Panel 3: Reciprocity</b>										
COVID	-0.09*** (0.01)	-0.14*** (0.03)	0.03** (0.01)	-0.02 (0.02)	0.02* (0.01)	0.00 (0.01)	0.01 (0.01)	-0.04* (0.02)	-0.04*** (0.01)	-0.06** (0.03)
Control Mean	0.41	0.25	0.16	0.08	0.13	0.05	0.21	0.12	0.25	0.15
Effect Size	-0.22	-0.55	0.17	-0.27	0.15	0.08	0.04	-0.35	-0.15	-0.44
p-Value (Native=Refugee)	0.23		0.28		0.44		0.29		0.59	
N	7102	1281	7102	1281	7102	1281	7102	1281	7102	1281
R-Squared	0.045	0.131	0.038	0.093	0.049	0.055	0.039	0.103	0.054	0.130
<b>Panel 4: Clustering coef.</b>										
COVID	-0.10*** (0.01)	-0.14*** (0.03)	-0.01 (0.01)	-0.03* (0.02)	-0.01 (0.01)	-0.03 (0.02)	-0.03*** (0.01)	-0.05 (0.03)	-0.06*** (0.01)	-0.04* (0.03)
Control Mean	0.38	0.29	0.16	0.09	0.17	0.08	0.24	0.13	0.26	0.13
Effect Size	-0.28	-0.47	-0.05	-0.34	-0.04	-0.33	-0.13	-0.40	-0.25	-0.34
p-Value (Native=Refugee)	0.53		0.50		0.63		0.70		0.63	
N	7102	1281	7102	1281	7102	1281	7102	1281	7102	1281
R-Squared	0.070	0.144	0.051	0.103	0.051	0.089	0.038	0.106	0.055	0.096

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row, for the network type, and for the subgroup of the sample specified on top of columns. The sample is restricted to classrooms with less than 40% absence on the day of the classroom visit. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

**Table B4:** Main Results by Gender Status

	Friendship		AS Provided		AS Received		ES Provided		ES Received	
	(1) Male	(2) Female	(3) Male	(4) Female	(5) Male	(6) Female	(7) Male	(8) Female	(9) Male	(10) Female
<b>Panel 1: Isolates</b>										
COVID	0.05*** (0.01)	0.05*** (0.01)	-0.05** (0.02)	-0.03 (0.02)	-0.09*** (0.02)	-0.04** (0.02)	0.01 (0.02)	-0.01 (0.02)	0.02 (0.02)	0.04*** (0.01)
Control Mean	0.24	0.19	0.41	0.32	0.53	0.37	0.34	0.26	0.35	0.23
Effect Size	0.23	0.25	-0.12	-0.10	-0.18	-0.12	0.02	-0.02	0.07	0.19
p-Value (Male = Female)	0.67		0.36		0.02		0.58		0.29	
N	4311	4072	4311	4072	4311	4072	4311	4072	4311	4072
R-Squared	0.079	0.104	0.058	0.069	0.067	0.093	0.072	0.086	0.073	0.104
<b>Panel 2: In-degree ties</b>										
COVID	-0.41*** (0.06)	-0.25*** (0.06)	0.15** (0.06)	0.33*** (0.07)	0.22*** (0.06)	0.21*** (0.07)	0.06 (0.05)	0.14* (0.08)	-0.03 (0.05)	-0.10 (0.07)
Control Mean	2.19	2.35	1.06	1.34	0.87	1.40	1.34	1.78	1.34	1.94
Effect Size	-0.19	-0.11	0.14	0.25	0.25	0.15	0.05	0.08	-0.02	-0.05
p-Value (Male = Female)	0.05		0.01		0.99		0.34		0.35	
N	4311	4072	4311	4072	4311	4072	4311	4072	4311	4072
R-Squared	0.082	0.079	0.065	0.086	0.067	0.080	0.062	0.082	0.059	0.091
<b>Panel 3: Reciprocity</b>										
COVID	-0.10*** (0.02)	-0.09*** (0.01)	0.02 (0.01)	0.02 (0.02)	0.03** (0.01)	0.01 (0.02)	0.01 (0.01)	-0.00 (0.02)	-0.01 (0.02)	-0.07*** (0.02)
Control Mean	0.36	0.42	0.12	0.17	0.08	0.16	0.16	0.23	0.17	0.30
Effect Size	-0.27	-0.22	0.15	0.13	0.36	0.03	0.04	-0.01	-0.06	-0.24
p-Value (Male = Female)	0.87		0.75		0.20		0.65		0.01	
N	4311	4072	4311	4072	4311	4072	4311	4072	4311	4072
R-Squared	0.081	0.087	0.044	0.049	0.045	0.050	0.041	0.060	0.043	0.074
<b>Panel 4: Clustering coef.</b>										
COVID	-0.12*** (0.02)	-0.10*** (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.02)	-0.03** (0.01)	-0.04** (0.01)	-0.06*** (0.01)	-0.06*** (0.02)
Control Mean	0.35	0.38	0.13	0.18	0.12	0.19	0.20	0.25	0.21	0.27
Effect Size	-0.35	-0.26	-0.09	-0.06	-0.07	-0.05	-0.14	-0.14	-0.30	-0.24
p-Value (Male = Female)	0.28		0.97		0.99		0.63		0.92	
N	4311	4072	4311	4072	4311	4072	4311	4072	4311	4072
R-Squared	0.094	0.080	0.060	0.068	0.055	0.064	0.056	0.061	0.072	0.076

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row, for the network type, and for the subgroup of the sample specified on top of columns. The sample is restricted to classrooms with less than 40% absence on the day of the classroom visit. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

**Table B5: Main Results by SES**

	Friendship		AS Provided		AS Received		ES Provided		ES Received	
	(1) Low	(2) High	(3) Low	(4) High	(5) Low	(6) High	(7) Low	(8) High	(9) Low	(10) High
<b>Panel 1: Isolates</b>										
COVID	0.07 (0.03)	0.03 (0.02)	0.01 (0.08)	-0.03 (0.03)	-0.11 (0.06)	-0.03 (0.03)	-0.00 (0.05)	-0.00 (0.04)	-0.01 (0.06)	0.02 (0.03)
Control Mean	0.22	0.22	0.38	0.37	0.46	0.44	0.32	0.30	0.34	0.31
Effect Size	0.29	0.14	0.02	-0.09	-0.23	-0.06	-0.01	-0.01	-0.03	0.07
p-Value (Low = High)	0.66		0.80		0.61		1.00		0.84	
N	969	1349	969	1349	969	1349	969	1349	969	1349
R-Squared	0.075	0.103	0.073	0.058	0.086	0.108	0.092	0.090	0.104	0.109
<b>Panel 2: In-degree ties</b>										
COVID	-0.53*** (0.12)	-0.24* (0.12)	0.17 (0.22)	0.20 (0.11)	0.15 (0.21)	0.09 (0.09)	0.25 (0.21)	0.09 (0.12)	-0.05 (0.21)	-0.05 (0.11)
Control Mean	2.22	2.31	1.21	1.20	1.15	1.15	1.40	1.62	1.51	1.65
Effect Size	-0.24	-0.10	0.14	0.16	0.13	0.08	0.18	0.06	-0.03	-0.03
p-Value (Low = High)	0.37		0.95		0.92		0.68		1.00	
N	969	1349	969	1349	969	1349	969	1349	969	1349
R-Squared	0.079	0.096	0.079	0.080	0.082	0.108	0.083	0.101	0.076	0.123
<b>Panel 3: Reciprocity</b>										
COVID	-0.10*** (0.03)	-0.11*** (0.02)	0.03 (0.04)	0.01 (0.03)	0.00 (0.02)	-0.01 (0.02)	0.02 (0.04)	0.00 (0.02)	-0.05 (0.03)	-0.06* (0.03)
Control Mean	0.36	0.41	0.14	0.15	0.10	0.13	0.15	0.19	0.20	0.25
Effect Size	-0.27	-0.28	0.19	0.10	0.03	-0.09	0.11	0.02	-0.24	-0.24
p-Value (Low = High)	0.88		0.93		0.88		0.91		0.93	
N	969	1349	969	1349	969	1349	969	1349	969	1349
R-Squared	0.080	0.093	0.046	0.065	0.068	0.055	0.057	0.074	0.059	0.095
<b>Panel 4: Clustering coef.</b>										
COVID	-0.12*** (0.02)	-0.05 (0.03)	-0.02 (0.04)	-0.03 (0.03)	-0.05 (0.04)	0.02 (0.02)	-0.01 (0.03)	-0.01 (0.02)	-0.06* (0.03)	-0.02 (0.03)
Control Mean	0.34	0.34	0.16	0.16	0.16	0.14	0.19	0.22	0.20	0.22
Effect Size	-0.35	-0.14	-0.13	-0.18	-0.32	0.11	-0.03	-0.04	-0.31	-0.08
p-Value (Low = High)	0.57		0.94		0.62		0.97		0.41	
N	969	1349	969	1349	969	1349	969	1349	969	1349
R-Squared	0.084	0.052	0.073	0.051	0.055	0.079	0.080	0.073	0.050	0.081

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row, for the network type, and for the subgroup of the sample specified on top of columns. The sample is restricted to classrooms with less than 40% absence on the day of the classroom visit. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

### A.3.2 Results on induced subgraphs

**Table B6:** Main Results

	(1)	(2)	(3)	(4)	(5)
	Friendship	AS Provided	AS Received	ES Provided	ES Received
<b>Panel 1: Isolates</b>					
COVID	0.03*** (0.01)	-0.05*** (0.02)	-0.09*** (0.02)	-0.03** (0.01)	0.01 (0.01)
Control Mean	0.18	0.33	0.43	0.28	0.27
Effect Size	0.14	-0.16	-0.22	-0.12	0.02
N	8826	8826	8826	8826	8826
R-Squared	0.05	0.05	0.07	0.05	0.06
<b>Panel 2: In-degree ties</b>					
COVID	-0.27*** (0.04)	0.30*** (0.05)	0.30*** (0.05)	0.18*** (0.04)	0.01 (0.04)
Control Mean	2.37	1.25	1.18	1.61	1.68
Effect Size	-0.11	0.24	0.25	0.11	0.01
N	8826	8826	8826	8826	8826
R-Squared	0.06	0.08	0.09	0.07	0.08
<b>Panel 3: Reciprocity</b>					
COVID	-0.07*** (0.01)	0.05*** (0.01)	0.04*** (0.01)	0.03*** (0.01)	-0.01 (0.01)
Control Mean	0.42	0.15	0.13	0.21	0.24
Effect Size	-0.16	0.33	0.35	0.13	-0.04
N	8826	8826	8826	8826	8826
R-Squared	0.06	0.05	0.06	0.05	0.06
<b>Panel 4: Clustering coef.</b>					
COVID	-0.09*** (0.01)	0.01 (0.01)	0.01 (0.01)	-0.02 (0.01)	-0.05*** (0.01)
Control Mean	0.38	0.16	0.16	0.24	0.25
Effect Size	-0.24	0.06	0.05	-0.07	-0.18
N	8826	8826	8826	8826	8826
R-Squared	0.06	0.06	0.06	0.05	0.06

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row and for the network type specified on top of columns. The sample is restricted to students present on the day of the classroom visits and the subset of their nominations who were also present on the day of the classroom visits. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

**Table B7: Main Results by Refugee Status**

	Friendship		AS Provided		AS Received		ES Provided		ES Received	
	(1) Native	(2) Refugee	(3) Native	(4) Refugee	(5) Native	(6) Refugee	(7) Native	(8) Refugee	(9) Native	(10) Refugee
<b>Panel 1: Isolates</b>										
COVID	0.01 (0.01)	0.09** (0.04)	-0.07*** (0.01)	0.04 (0.04)	-0.10*** (0.02)	-0.07* (0.04)	-0.03*** (0.01)	-0.04 (0.04)	0.00 (0.01)	0.02 (0.04)
Control Mean	0.16	0.34	0.31	0.47	0.39	0.64	0.25	0.49	0.24	0.48
Effect Size	0.09	0.27	-0.22	0.09	-0.25	-0.11	-0.14	-0.08	0.00	0.05
p-Value (Native=Refugee)	0.07		0.08		0.61		0.90		0.62	
N	7604	1222	7604	1222	7604	1222	7604	1222	7604	1222
R-Squared	0.015	0.111	0.037	0.109	0.049	0.109	0.022	0.099	0.030	0.085
<b>Panel 2: In-degree ties</b>										
COVID	-0.23*** (0.04)	-0.47*** (0.11)	0.36*** (0.05)	-0.10 (0.09)	0.33*** (0.05)	0.10 (0.08)	0.21*** (0.04)	0.03 (0.10)	0.02 (0.05)	-0.00 (0.10)
Control Mean	2.53	1.39	1.32	0.87	1.28	0.59	1.73	0.88	1.82	0.83
Effect Size	-0.09	-0.34	0.28	-0.11	0.26	0.17	0.12	0.03	0.01	-0.00
p-Value (Native=Refugee)	0.05		0.00		0.02		0.06		0.82	
N	7604	1222	7604	1222	7604	1222	7604	1222	7604	1222
R-Squared	0.014	0.104	0.065	0.104	0.068	0.087	0.043	0.078	0.050	0.065
<b>Panel 3: Reciprocity</b>										
COVID	-0.06*** (0.01)	-0.10*** (0.03)	0.06*** (0.01)	0.01 (0.03)	0.05*** (0.01)	0.05** (0.02)	0.03*** (0.01)	0.01 (0.03)	-0.01 (0.01)	-0.02 (0.03)
Control Mean	0.44	0.30	0.16	0.11	0.14	0.07	0.22	0.14	0.25	0.15
Effect Size	-0.14	-0.35	0.37	0.06	0.34	0.72	0.14	0.10	-0.03	-0.12
p-Value (Native=Refugee)	0.21		0.17		0.91		0.68		0.81	
N	7604	1222	7604	1222	7604	1222	7604	1222	7604	1222
R-Squared	0.039	0.114	0.049	0.107	0.057	0.087	0.043	0.121	0.054	0.139
<b>Panel 4: Clustering coef.</b>										
COVID	-0.08*** (0.01)	-0.13*** (0.03)	0.01 (0.01)	-0.01 (0.02)	0.01 (0.01)	-0.01 (0.02)	-0.02* (0.01)	-0.03 (0.03)	-0.05*** (0.01)	-0.02 (0.03)
Control Mean	0.39	0.34	0.16	0.12	0.17	0.10	0.25	0.15	0.27	0.15
Effect Size	-0.22	-0.38	0.07	-0.09	0.05	-0.10	-0.06	-0.17	-0.18	-0.10
p-Value (Native=Refugee)	0.24		0.48		0.55		0.83		0.30	
N	7604	1222	7604	1222	7604	1222	7604	1222	7604	1222
R-Squared	0.065	0.127	0.055	0.122	0.054	0.101	0.042	0.113	0.057	0.109

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row, for the network type, and for the subgroup of the sample specified on top of columns. The sample is restricted to students present on the day of the classroom visits and the subset of their nominations who were also present on the day of the classroom visits. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

**Table B8: Main Results by Gender Status**

	Friendship		AS Provided		AS Received		ES Provided		ES Received	
	(1) Male	(2) Female	(3) Male	(4) Female	(5) Male	(6) Female	(7) Male	(8) Female	(9) Male	(10) Female
<b>Panel 1: Isolates</b>										
COVID	0.02* (0.01)	0.03*** (0.01)	-0.07*** (0.02)	-0.04* (0.02)	-0.12*** (0.02)	-0.06*** (0.02)	-0.03* (0.02)	-0.04** (0.02)	-0.00 (0.02)	0.02 (0.01)
Control Mean	0.21	0.16	0.38	0.28	0.50	0.35	0.32	0.24	0.34	0.21
Effect Size	0.10	0.21	-0.18	-0.13	-0.25	-0.18	-0.08	-0.15	-0.01	0.09
p-Value (Male = Female)	0.57		0.06		0.01		0.63		0.24	
N	4496	4330	4496	4330	4496	4330	4496	4330	4496	4330
R-Squared	0.049	0.065	0.048	0.054	0.063	0.074	0.050	0.054	0.049	0.062
<b>Panel 2: In-degree ties</b>										
COVID	-0.32*** (0.05)	-0.21*** (0.05)	0.22*** (0.06)	0.38*** (0.06)	0.31*** (0.06)	0.27*** (0.06)	0.14*** (0.05)	0.22*** (0.07)	0.04 (0.05)	-0.02 (0.06)
Control Mean	2.28	2.46	1.11	1.41	0.90	1.47	1.38	1.85	1.38	2.00
Effect Size	-0.14	-0.09	0.20	0.27	0.34	0.19	0.10	0.12	0.03	-0.01
p-Value (Male = Female)	0.10		0.03		0.62		0.34		0.39	
N	4496	4330	4496	4330	4496	4330	4496	4330	4496	4330
R-Squared	0.059	0.056	0.066	0.075	0.068	0.069	0.054	0.065	0.048	0.072
<b>Panel 3: Reciprocity</b>										
COVID	-0.06*** (0.02)	-0.07*** (0.01)	0.05*** (0.01)	0.06*** (0.02)	0.05*** (0.01)	0.04** (0.01)	0.03*** (0.01)	0.02 (0.02)	0.02 (0.01)	-0.04** (0.02)
Control Mean	0.38	0.45	0.12	0.18	0.09	0.17	0.17	0.25	0.18	0.30
Effect Size	-0.16	-0.16	0.38	0.31	0.60	0.22	0.20	0.09	0.11	-0.13
p-Value (Male = Female)	0.61		0.60		0.43		0.59		0.01	
N	4496	4330	4496	4330	4496	4330	4496	4330	4496	4330
R-Squared	0.056	0.064	0.046	0.057	0.047	0.060	0.038	0.054	0.040	0.063
<b>Panel 4: Clustering coef.</b>										
COVID	-0.10*** (0.02)	-0.08*** (0.01)	0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.02)	-0.01 (0.01)	-0.02 (0.01)	-0.04*** (0.01)	-0.05*** (0.01)
Control Mean	0.37	0.40	0.13	0.18	0.13	0.20	0.21	0.27	0.22	0.29
Effect Size	-0.27	-0.20	0.02	0.07	0.04	0.05	-0.06	-0.07	-0.19	-0.17
p-Value (Male = Female)	0.38		0.55		0.84		0.73		0.66	
N	4496	4330	4496	4330	4496	4330	4496	4330	4496	4330
R-Squared	0.077	0.067	0.062	0.060	0.053	0.067	0.052	0.063	0.063	0.067

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row, for the network type, and for the subgroup of the sample specified on top of columns. The sample is restricted to students present on the day of the classroom visits and the subset of their nominations who were also present on the day of the classroom visits. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

**Table B9: Main Results by SES**

	Friendship		AS Provided		AS Received		ES Provided		ES Received	
	(1) Low	(2) High	(3) Low	(4) High	(5) Low	(6) High	(7) Low	(8) High	(9) Low	(10) High
<b>Panel 1: Isolates</b>										
COVID	0.04 (0.03)	0.01 (0.02)	-0.04 (0.04)	-0.04 (0.03)	-0.10*** (0.02)	-0.04 (0.03)	-0.05* (0.03)	-0.02 (0.04)	-0.06* (0.03)	0.01 (0.03)
Control Mean	0.20	0.19	0.34	0.35	0.45	0.42	0.32	0.28	0.33	0.29
Effect Size	0.20	0.06	-0.13	-0.11	-0.23	-0.11	-0.16	-0.06	-0.20	0.02
p-Value (Low = High)	0.73		0.98		0.64		0.63		0.55	
N	1294	1206	1294	1206	1294	1206	1294	1206	1294	1206
R-Squared	0.044	0.085	0.064	0.057	0.077	0.103	0.076	0.084	0.077	0.095
<b>Panel 2: In-degree ties</b>										
COVID	-0.40*** (0.07)	-0.20 (0.12)	0.29** (0.10)	0.24* (0.12)	0.30** (0.10)	0.14 (0.11)	0.26* (0.12)	0.14 (0.13)	0.08 (0.13)	-0.02 (0.11)
Control Mean	2.31	2.40	1.27	1.25	1.15	1.20	1.48	1.68	1.54	1.72
Effect Size	-0.17	-0.08	0.22	0.19	0.26	0.12	0.17	0.08	0.05	-0.01
p-Value (Low = High)	0.25		0.88		0.77		0.66		0.77	
N	1294	1206	1294	1206	1294	1206	1294	1206	1294	1206
R-Squared	0.048	0.082	0.066	0.080	0.077	0.107	0.072	0.098	0.077	0.114
<b>Panel 3: Reciprocity</b>										
COVID	-0.07*** (0.02)	-0.08*** (0.02)	0.07** (0.03)	0.04 (0.03)	0.05* (0.03)	0.01 (0.02)	0.03 (0.02)	0.03 (0.02)	0.00 (0.02)	-0.03 (0.03)
Control Mean	0.39	0.43	0.13	0.16	0.10	0.14	0.16	0.20	0.18	0.26
Effect Size	-0.17	-0.18	0.57	0.26	0.54	0.06	0.17	0.17	0.02	-0.12
p-Value (Low = High)	0.92		0.80		0.68		0.93		0.76	
N	1294	1206	1294	1206	1294	1206	1294	1206	1294	1206
R-Squared	0.048	0.073	0.048	0.074	0.045	0.058	0.057	0.076	0.052	0.092
<b>Panel 4: Clustering coef.</b>										
COVID	-0.09*** (0.01)	-0.03 (0.03)	0.01 (0.03)	-0.01 (0.03)	-0.01 (0.03)	0.03 (0.03)	-0.01 (0.03)	0.01 (0.02)	-0.04* (0.02)	-0.01 (0.03)
Control Mean	0.35	0.36	0.17	0.16	0.16	0.15	0.20	0.23	0.22	0.23
Effect Size	-0.26	-0.08	0.05	-0.07	-0.09	0.20	-0.05	0.03	-0.17	-0.04
p-Value (Low = High)	0.58		0.84		0.74		0.74		0.57	
N	1294	1206	1294	1206	1294	1206	1294	1206	1294	1206
R-Squared	0.071	0.039	0.069	0.049	0.052	0.085	0.056	0.067	0.060	0.074

Note: Each cell reports the OLS estimates of the effect of COVID-19 on the respective network measure at the beginning of the row, for the network type, and for the subgroup of the sample specified on top of columns. The sample is restricted to students present on the day of the classroom visits and the subset of their nominations who were also present on the day of the classroom visits. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

## A.4 Additional Heterogeneity Analyses

**Table C1:** Associations between Social Network Measures and Teacher Demographics

	(1)	(2)	(3)	(4)	(5)
	Friendship	AS Provided	AS Received	ES Provided	ES Received
<b>Panel 1: Isolates</b>					
COVID x Male	0.01 (0.02)	0.05 (0.03)	0.01 (0.03)	0.04 (0.03)	0.01 (0.02)
COVID x Age	-0.00 (0.00)	-0.00 (0.01)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
COVID x Experience	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
COVID x Children	0.02 (0.02)	0.01 (0.02)	0.01 (0.02)	0.00 (0.02)	-0.00 (0.02)
COVID x Marital Status	-0.00 (0.03)	-0.01 (0.04)	-0.03 (0.05)	0.00 (0.04)	-0.01 (0.04)
N	10287	10287	10287	10287	10287
R-Squared	0.09	0.07	0.09	0.08	0.09
<b>Panel 2: In-degree Ties</b>					
COVID x Male	-0.13 (0.09)	-0.08 (0.07)	-0.02 (0.09)	-0.11 (0.09)	-0.07 (0.08)
COVID x Age	0.01 (0.01)	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	0.00 (0.01)
COVID x Experience	-0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)	-0.01 (0.01)	-0.00 (0.01)
COVID x Children	-0.03 (0.06)	-0.02 (0.06)	-0.01 (0.06)	-0.02 (0.07)	0.04 (0.06)
COVID x Marital Status	0.04 (0.11)	0.08 (0.10)	0.03 (0.10)	-0.05 (0.10)	-0.02 (0.10)
N	10287	10287	10287	10287	10287
R-Squared	0.08	0.08	0.09	0.09	0.10
<b>Panel 3: Reciprocity</b>					
COVID x Male	0.03 (0.02)	-0.01 (0.02)	-0.04** (0.02)	-0.01 (0.02)	-0.01 (0.03)
COVID x Age	0.00* (0.00)	0.00 (0.00)	0.00 (0.00)	0.01*** (0.00)	0.00 (0.00)
COVID x Experience	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00* (0.00)	-0.01** (0.00)
COVID x Children	-0.01 (0.02)	-0.02 (0.01)	-0.01 (0.01)	-0.01 (0.02)	0.02 (0.02)
COVID x Marital Status	-0.01 (0.03)	0.08*** (0.03)	0.05** (0.02)	0.02 (0.03)	-0.01 (0.04)
N	10287	10287	10287	10287	10287
R-Squared	0.08	0.05	0.05	0.05	0.07
<b>Panel 4: Clustering coef.</b>					
COVID x Male	-0.02 (0.03)	-0.01 (0.02)	0.02 (0.02)	0.00 (0.02)	-0.00 (0.02)
COVID x Age	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
COVID x Experience	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
COVID x Children	-0.01 (0.01)	0.00 (0.01)	-0.01 (0.02)	0.00 (0.01)	-0.00 (0.01)
COVID x Marital Status	0.00 (0.03)	0.00 (0.02)	0.03 (0.02)	-0.01 (0.02)	-0.04 (0.03)
N	10287	10287	10287	10287	10287
R-Squared	0.08	0.05	0.06	0.06	0.07

Note: Each cell reports the OLS estimates of the effect of COVID-19 interacted with a given SES indicator on outcomes that are specified at the beginning of the row for the samples that are given at the top of the columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

**Table C2:** Associations between Social Network Measures and Teaching Styles

	(1)	(2)	(3)	(4)	(5)
	Friendship	AS Provided	AS Received	ES Provided	ES Received
<b>Panel 1: Isolates</b>					
COVID x Growth Mindset	-0.00 (0.01)	-0.02 (0.01)	-0.02 (0.02)	-0.01 (0.01)	-0.01 (0.01)
COVID x Extrinsic Motivation	0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	0.03** (0.01)	0.01 (0.01)
COVID x Inquiry-based Pedagogy	-0.01 (0.01)	-0.00 (0.01)	-0.02 (0.02)	0.00 (0.01)	-0.02 (0.01)
COVID x Modern Teaching	0.02* (0.01)	0.02 (0.01)	0.04** (0.01)	-0.01 (0.01)	0.02* (0.01)
COVID x Warmth	-0.01 (0.01)	0.02 (0.02)	0.00 (0.02)	0.01 (0.01)	0.01 (0.01)
N	9553	9553	9553	9553	9553
R-Squared	0.09	0.07	0.09	0.09	0.10
<b>Panel 2: In-degree Ties</b>					
COVID x Growth Mindset	0.02 (0.04)	0.08** (0.04)	0.09** (0.04)	0.04 (0.04)	0.05 (0.03)
COVID x Extrinsic Motivation	-0.01 (0.03)	-0.02 (0.04)	-0.02 (0.03)	-0.03 (0.04)	0.00 (0.03)
COVID x Inquiry-based Pedagogy	0.06 (0.05)	-0.02 (0.04)	-0.02 (0.04)	0.02 (0.05)	-0.01 (0.04)
COVID x Modern Teaching	-0.08* (0.04)	-0.07 (0.04)	-0.06 (0.04)	-0.00 (0.05)	-0.02 (0.04)
COVID x Warmth	-0.00 (0.05)	-0.03 (0.05)	-0.01 (0.05)	-0.03 (0.05)	-0.05 (0.05)
N	9553	9553	9553	9553	9553
R-Squared	0.09	0.09	0.10	0.09	0.11
<b>Panel 3: Reciprocity</b>					
COVID x Growth Mindset	-0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	-0.01 (0.01)	0.00 (0.01)
COVID x Extrinsic Motivation	-0.00 (0.01)	0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)	0.00 (0.01)
COVID x Inquiry-based Pedagogy	0.00 (0.01)	0.01 (0.01)	-0.01 (0.01)	0.00 (0.01)	0.00 (0.01)
COVID x Modern Teaching	0.01 (0.01)	-0.01 (0.01)	-0.02** (0.01)	0.02* (0.01)	-0.00 (0.01)
COVID x Warmth	-0.01 (0.01)	-0.01 (0.01)	0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
N	9553	9553	9553	9553	9553
R-Squared	0.09	0.05	0.06	0.06	0.07
<b>Panel 4: Clustering coef.</b>					
COVID x Growth Mindset	-0.00 (0.01)	0.01 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)
COVID x Extrinsic Motivation	0.00 (0.01)	-0.01 (0.01)	0.00 (0.01)	-0.00 (0.01)	0.01 (0.01)
COVID x Inquiry-based Pedagogy	0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)	-0.01 (0.01)	-0.02 (0.01)
COVID x Modern Teaching	0.00 (0.01)	0.01 (0.01)	-0.00 (0.01)	0.02 (0.01)	0.01 (0.01)
COVID x Warmth	-0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)	-0.02 (0.01)	0.00 (0.01)
N	9553	9553	9553	9553	9553
R-Squared	0.09	0.06	0.06	0.06	0.08

Note: Each cell reports the OLS estimates of the effect of COVID-19 interacted with a given teaching style on outcomes that are specified at the beginning of the row for the samples that are given at the top of the columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

**Table C3:** Associations between Social Network Measures and Students' Perspective on Teachers

	(1)	(2)	(3)	(4)	(5)
	Friendship	AS Provided	AS Received	ES Provided	ES Received
<b>Panel 1: Isolates</b>					
COVID x Captivate	0.01 (0.01)	-0.01 (0.01)	-0.00 (0.01)	0.02** (0.01)	0.00 (0.01)
COVID x Care	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.02)	-0.02 (0.01)	-0.01 (0.01)
COVID x Challenge	0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	-0.00 (0.01)
COVID x Clarify	0.02 (0.01)	0.01 (0.02)	0.01 (0.02)	0.02 (0.02)	-0.01 (0.01)
COVID x Confer	-0.01 (0.01)	-0.02 (0.01)	0.01 (0.02)	-0.00 (0.02)	0.01 (0.01)
COVID x Consolidate	-0.00 (0.01)	0.01 (0.01)	-0.01 (0.01)	0.02 (0.01)	-0.00 (0.01)
COVID x Control	-0.00 (0.01)	0.00 (0.01)	0.02 (0.01)	-0.01 (0.01)	0.01 (0.01)
N	7355	7355	7355	7355	7355
R-Squared	0.06	0.06	0.09	0.06	0.07
<b>Panel 2: In-degree Ties</b>					
COVID x Captivate	0.04 (0.05)	0.13*** (0.03)	0.06 (0.04)	0.04 (0.04)	-0.01 (0.04)
COVID x Care	-0.00 (0.05)	0.02 (0.04)	0.01 (0.04)	0.04 (0.04)	0.02 (0.04)
COVID x Challenge	-0.09* (0.04)	-0.02 (0.04)	-0.07* (0.04)	-0.06 (0.04)	-0.07* (0.04)
COVID x Clarify	-0.01 (0.06)	0.02 (0.05)	-0.03 (0.05)	-0.03 (0.06)	-0.00 (0.05)
COVID x Confer	0.11** (0.06)	0.08* (0.04)	0.10** (0.05)	0.06 (0.05)	0.09* (0.05)
COVID x Consolidate	-0.07 (0.06)	-0.05 (0.04)	-0.03 (0.04)	-0.09* (0.05)	-0.03 (0.04)
COVID x Control	-0.01 (0.05)	0.04 (0.03)	-0.02 (0.04)	0.06 (0.04)	-0.02 (0.04)
N	7355	7355	7355	7355	7355
R-Squared	0.09	0.09	0.12	0.10	0.11
<b>Panel 3: Reciprocity</b>					
COVID x Captivate	0.00 (0.01)	0.01* (0.01)	0.01 (0.01)	-0.00 (0.01)	-0.01 (0.01)
COVID x Care	-0.01 (0.01)	-0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
COVID x Challenge	-0.02* (0.01)	0.00 (0.01)	0.01 (0.01)	-0.00 (0.01)	-0.00 (0.01)
COVID x Clarify	-0.00 (0.01)	0.01 (0.01)	-0.01 (0.01)	-0.00 (0.01)	-0.01 (0.01)
COVID x Confer	0.03*** (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)	0.00 (0.01)
COVID x Consolidate	-0.01 (0.01)	0.00 (0.01)	-0.01 (0.01)	0.01 (0.01)	0.00 (0.01)
COVID x Control	-0.01 (0.01)	-0.00 (0.01)	-0.01 (0.01)	0.01 (0.01)	-0.00 (0.01)
N	7355	7355	7355	7355	7355
R-Squared	0.08	0.05	0.07	0.06	0.07
<b>Panel 4: Clustering coef.</b>					
COVID x Captivate	0.00 (0.01)	0.01 (0.01)	0.01* (0.01)	-0.01* (0.01)	-0.01 (0.01)
COVID x Care	0.02** (0.01)	-0.01 (0.01)	-0.00 (0.01)	0.01 (0.01)	0.01 (0.01)
COVID x Challenge	-0.01 (0.01)	-0.00 (0.01)	-0.00 (0.01)	0.01 (0.01)	-0.01 (0.01)
COVID x Clarify	0.01 (0.01)	-0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	0.03*** (0.01)
COVID x Confer	-0.00 (0.01)	0.02*** (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.02 (0.01)
COVID x Consolidate	-0.00 (0.01)	-0.01* (0.01)	-0.01 (0.01)	0.01 (0.01)	-0.01* (0.01)
COVID x Control	-0.00 (0.01)	0.00 (0.01)	-0.01 (0.01)	0.01 (0.01)	0.00 (0.01)
N	7355	7355	7355	7355	7355
R-Squared	0.07	0.06	0.06	0.06	0.08

Note: Each cell reports the OLS estimates of the effect of COVID-19 interacted with a given students' perspective on teacher on outcomes that are specified at the beginning of the row for the samples that are given at the top of the columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

**Table C4:** Associations between Social Network Measures and Parenting Styles

	(1)	(2)	(3)	(4)	(5)
	Friendship	AS Provided	AS Received	ES Provided	ES Received
<b>Panel 1: Isolates</b>					
COVID x Obedience	-0.01 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	-0.02 (0.01)
COVID x Warmth	-0.01 (0.01)	-0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	-0.00 (0.01)
COVID x Punishment	-0.01 (0.01)	0.00 (0.01)	-0.02 (0.01)	-0.01 (0.01)	0.01 (0.01)
COVID x Reasoning	-0.02* (0.01)	-0.02 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)
N	7373	7373	7373	7373	7373
R-Squared	0.06	0.05	0.08	0.06	0.07
<b>Panel 2: In-degree Ties</b>					
COVID x Obedience	0.01 (0.05)	-0.05 (0.04)	-0.02 (0.04)	0.06 (0.04)	0.06 (0.04)
COVID x Warmth	0.00 (0.05)	0.07** (0.03)	-0.01 (0.04)	-0.01 (0.03)	-0.01 (0.04)
COVID x Punishment	0.06 (0.05)	-0.02 (0.04)	-0.00 (0.04)	0.00 (0.04)	-0.04 (0.04)
COVID x Reasoning	0.07 (0.05)	0.04 (0.04)	-0.00 (0.04)	0.07* (0.04)	0.00 (0.04)
N	7373	7373	7373	7373	7373
R-Squared	0.08	0.09	0.11	0.09	0.10
<b>Panel 3: Reciprocity</b>					
COVID x Obedience	-0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	-0.00 (0.01)	0.02** (0.01)
COVID x Warmth	-0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)	0.00 (0.01)	-0.01 (0.01)
COVID x Punishment	0.00 (0.01)	-0.02** (0.01)	-0.02*** (0.01)	-0.01 (0.01)	-0.01 (0.01)
COVID x Reasoning	0.00 (0.01)	0.00 (0.01)	-0.01 (0.01)	-0.00 (0.01)	-0.01 (0.01)
N	7373	7373	7373	7373	7373
R-Squared	0.07	0.05	0.06	0.05	0.07
<b>Panel 4: Clustering coef.</b>					
COVID x Obedience	-0.01 (0.01)	0.00 (0.01)	-0.01 (0.01)	-0.00 (0.01)	0.01 (0.01)
COVID x Warmth	0.01 (0.01)	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	0.01 (0.01)
COVID x Punishment	-0.01 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	-0.00 (0.01)
COVID x Reasoning	-0.01 (0.01)	0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)	0.01 (0.01)
N	7373	7373	7373	7373	7373
R-Squared	0.06	0.06	0.06	0.05	0.07

Note: Each cell reports the OLS estimates of the effect of COVID-19 interacted with a given parenting style on outcomes that are specified at the beginning of the row for the samples that are given at the top of the columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

**Table C5:** Associations between Social Network Measures and SES Indicators

	(1)	(2)	(3)	(4)	(5)
	Friendship	AS Provided	AS Received	ES Provided	ES Received
<b>Panel 1: Isolates</b>					
COVID x Number of Siblings	0.01 (0.00)	0.01*** (0.00)	-0.00 (0.01)	-0.00 (0.00)	-0.00 (0.00)
COVID x Father Working	0.06 (0.04)	-0.03 (0.04)	-0.00 (0.03)	-0.02 (0.04)	0.03 (0.04)
COVID x Mother Working	-0.02 (0.02)	0.01 (0.02)	0.00 (0.03)	0.01 (0.02)	-0.02 (0.02)
COVID x Computer at Home	0.00 (0.02)	-0.03 (0.02)	-0.02 (0.02)	0.01 (0.02)	0.04 (0.02)
COVID x Internet at Home	-0.02 (0.02)	-0.02 (0.02)	-0.04* (0.02)	-0.00 (0.02)	-0.01 (0.02)
N	7945	7945	7945	7945	7945
R-Squared	0.06	0.06	0.09	0.06	0.07
<b>Panel 2: In-degree Ties</b>					
COVID x Number of Siblings	-0.02 (0.02)	-0.07*** (0.01)	-0.03** (0.01)	-0.03** (0.01)	-0.01 (0.01)
COVID x Father Working	-0.09 (0.14)	0.18* (0.10)	0.00 (0.10)	0.19* (0.11)	0.02 (0.10)
COVID x Mother Working	0.07 (0.09)	-0.01 (0.06)	-0.03 (0.06)	0.07 (0.06)	-0.01 (0.07)
COVID x Computer at Home	-0.01 (0.08)	0.12** (0.06)	0.05 (0.06)	-0.03 (0.09)	-0.21** (0.08)
COVID x Internet at Home	0.11 (0.11)	0.01 (0.08)	0.10 (0.08)	-0.01 (0.08)	0.09 (0.08)
N	7945	7945	7945	7945	7945
R-Squared	0.08	0.09	0.11	0.09	0.10
<b>Panel 3: Reciprocity</b>					
COVID x Number of Siblings	-0.00 (0.00)	-0.01** (0.00)	-0.01* (0.00)	-0.00 (0.00)	-0.00 (0.00)
COVID x Father Working	0.00 (0.03)	0.02 (0.02)	0.01 (0.02)	-0.01 (0.03)	-0.01 (0.03)
COVID x Mother Working	0.05*** (0.01)	0.02 (0.02)	-0.03* (0.01)	0.02 (0.01)	0.05*** (0.01)
COVID x Computer at Home	-0.01 (0.02)	0.00 (0.02)	0.02 (0.01)	-0.00 (0.02)	-0.04** (0.02)
COVID x Internet at Home	0.01 (0.02)	-0.00 (0.02)	-0.01 (0.02)	0.01 (0.02)	-0.02 (0.02)
N	7945	7945	7945	7945	7945
R-Squared	0.07	0.05	0.07	0.06	0.07
<b>Panel 4: Clustering coef.</b>					
COVID x Number of Siblings	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
COVID x Father Working	0.06** (0.03)	-0.01 (0.02)	0.01 (0.03)	0.02 (0.02)	0.00 (0.02)
COVID x Mother Working	0.03 (0.02)	-0.01 (0.01)	0.01 (0.01)	-0.00 (0.01)	-0.02 (0.02)
COVID x Computer at Home	0.00 (0.02)	-0.01 (0.01)	0.00 (0.02)	0.00 (0.01)	-0.00 (0.01)
COVID x Internet at Home	0.02 (0.02)	0.02** (0.01)	0.04*** (0.01)	0.00 (0.02)	-0.00 (0.02)
N	7945	7945	7945	7945	7945
R-Squared	0.06	0.06	0.06	0.05	0.07

Note: Each cell reports the OLS estimates of the effect of COVID-19 interacted with a given SES indicator on outcomes that are specified at the beginning of the row for the samples that are given at the top of the columns. All regressions use fully specified models that control for school-fixed effects, student, teacher, and classroom characteristics. Standard errors, given in parentheses, are clustered at the school level. \*, \*\*, or \*\*\* indicates significance at the 10%, 5%, and 1% levels, respectively.

## A.5 Additional Balance Tests

**Table D1:** Balance of SES Indicators, Parenting Styles, Teachers' Teaching Styles and Students' Perspective on Teachers Across Cohorts

	(1) Mean of 2018	(2) Mean of 2021	(3) Difference	(4) p-value	(5) N
<b>SES Indicators:</b>					
Number of Siblings	2.868	2.991	0.123	0.029	8316
Father working	0.914	0.921	0.007	0.362	8356
Mother working	0.290	0.319	0.029	0.039	8494
Computer at Home	0.510	0.487	-0.023	0.078	8499
Internet at Home	0.640	0.833	0.193	0.000	8436
<b>Parenting styles:</b>					
Obedience	-0.002	-0.012	-0.010	0.772	7954
Warmth	0.004	-0.011	-0.015	0.704	7945
Punishment	-0.002	0.042	0.044	0.088	8108
Reasoning	0.003	-0.065	-0.068	0.005	8129
<b>Teaching styles:</b>					
Growth Mindset	0.004	-0.155	-0.159	0.136	339
Extrinsic Motivation	0.017	0.059	0.042	0.826	339
Inquiry-based Pedagogy	-0.029	-0.096	-0.067	0.455	340
Modern Teaching	0.021	-0.361	-0.382	0.033	339
Warmth	0.021	-0.283	-0.304	0.063	335
<b>Students' Perspective on Teachers:</b>					
Captivate	-0.025	-0.206	-0.181	0.001	345
Care	-0.021	-0.064	-0.043	0.314	345
Challenge	-0.021	-0.052	-0.031	0.483	345
Clarify	-0.028	-0.057	-0.029	0.289	345
Confer	-0.035	-0.109	-0.074	0.158	345
Consolidate	-0.002	-0.106	-0.104	0.043	345
Control	-0.020	0.088	0.108	0.109	345

Note: All variables are obtained via survey answers from students and teachers. Differences are calculated by subtracting the mean of 2018 from the mean of 2021. Associated p-values are obtained by regressing the outcome variable on the COVID dummy, which takes the value 0 for the cohort of 2018 and the value 1 for the cohort of 2021, controlling for school fixed effects for SES indicators and parenting styles and controlling for district fixed effects for teaching styles and students' perspective on teachers.

**Table D2:** Balance of SES Indicators and Parenting Styles Across Ethnicities

	(1)	(2)	(3)	(4)	(5)
	Natives	Refugees	Difference	p-value	N
<b>SES Indicators:</b>					
Number of Siblings	2.702	4.389	1.687	0.000	8316
Father working	0.930	0.831	-0.099	0.000	8356
Mother working	0.307	0.280	-0.027	0.163	8494
Computer at Home	0.519	0.372	-0.147	0.000	8499
Internet at Home	0.726	0.754	0.028	0.070	8436
<b>Parenting styles:</b>					
Obedience	-0.026	0.124	0.150	0.001	7954
Warmth	0.029	-0.221	-0.250	0.000	7945
Punishment	-0.019	0.277	0.296	0.000	8108
Reasoning	-0.000	-0.220	-0.220	0.000	8129

Note: All variables are obtained via survey answers from students. Differences are calculated by subtracting the mean of natives from the mean of refugees. Associated p-values are obtained by regressing the outcome variable on a dummy variable, which takes 0 for natives and 1 for refugees, controlling for school fixed effects.

## A.6 Data Inventories

**Figure B1:** Network Elicitation Templates

	1	2	3
My best friends in the class			
Classmates whom I academically support			
Classmates who support me academically			
Classmates whom I emotionally support			
Classmates who support me emotionally			

**Table E1:** Student Survey Inventory: Parenting Style

<i>4-point likert scale: completely agree, agree, disagree, completely disagree</i>	
<b>Inventory</b>	<b>Items</b>
Obedience	My mom asks me to do something without explaining why. My dad asks me to do something without explaining why. My mom does not allow me to question her decisions. My dad does not allow me to question her decisions.
Warmth	When I am scared or sad, my mom hugs and comforts me. When I am scared or sad, my dad hugs and comforts me. My mom jokes and plays games with me. My dad jokes and plays games with me.
Punishment	My mom uses physical punishment when I do something wrong. My dad uses physical punishment when I do something wrong. My mom takes away a privilege when I go against a rule. My dad takes away a privilege when I go against a rule.
Reasoning	My mom gets angry with me when I do something wrong, but she never explains why. My dad gets angry with me when I do something wrong, but she never explains why. My mom tells me how people feel. My dad tells me how people feel.

**Figure B2:** Sample Question: Reading the Mind in the Eyes (Cognitive Empathy)

envious

frightened



relaxed

hate

Note: The questions inquire about the emotion conveyed by the eyes. There are four options provided for each question, and the student is asked to select the correct one. The sub-scale of the Reading the Mind in the Eyes that we use contains 14 questions.

**Table E2:** Teachers' Inventory

<i>4-point likert scale: completely agree, agree, disagree, completely disagree</i>	
<b>Inventory</b>	<b>Exemplary Items</b>
<u>Teachers' Survey</u>  Growth Mindset  Extrinsic Motivation  Inquiry-based Pedagogy  Modern Teaching  Warmth	<p>Your intelligence is something that you cannot change very much.</p> <p>Punishment is necessary to create a disciplined class.</p> <p>I encourage my students to do research on topics they are interested in and discuss these topics with me.</p> <p>It does not matter if there is noise in the classroom as long as the students are busy with something productive.</p> <p>Teachers should be serious and authoritative in their relationships with students.</p>
<u>Students' Survey on Teacher</u>  Captivate  Care  Challenge  Clarify  Confer  Consolidate  Control	<p>We have interesting homework.</p> <p>My teacher know what I am interested of.</p> <p>My teacher wants me to do my best.</p> <p>My teacher knows when the class understands, and when we do not.</p> <p>My teacher asks us to discuss different ideas.</p> <p>When my teacher marks my work, s/he writes notes on my papers.</p> <p>Some students behave so badly in the class that it slows down our learning.</p>

**Table E3:** Student Survey Sample: Socioemotional Skills

<i>4-point likert scale: completely agree, agree, disagree, completely disagree</i>	
<b>Inventory</b>	<b>Items</b>
Emotional Empathy	<p>When I see someone being treated unfairly, I feel very much pity for them.</p> <p>I often have tender, concerned feelings for people less fortunate than me.</p> <p>When I see someone being taken advantage of, I feel protective towards them.</p> <p>I would describe myself as a pretty soft-hearted person.</p> <p>Sometimes I do not feel very sorry for other people when they are having problems.</p>
Impulsivity	<p>I get on nerves when close to solving but can't figure it out.</p> <p>I cannot focus on a subject long time. I easily lose interest .</p> <p>I decide what to do quickly and then go and do it right away.</p> <p>Waits turn when playing a game.</p> <p>I get into trouble because I do things without thinking first.</p> <p>I tend to say the first thing that comes to mind, without stopping to think about.</p>