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Absent Peers, Present Challenges: The Differential Impact of In-Person and Virtual Classmate Absences on Future Attendance

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Abstract

Policymakers and educational leaders across state and federal agencies have invested considerable effort in identifying how schools can both mitigate and exacerbate student absenteeism. Despite extensive research into school-level characteristics and programs, there remains a notable gap in understanding the impact of classroom-level factors on absenteeism. This study investigates how classmates' absences impact student absenteeism in four Texas school districts, analyzing both in-person and virtual contexts. Using a novel approach that accounts for day-to-day attendance variation, findings indicate that in-person absenteeism among peers significantly increases a student's absenteeism, with effects lasting up to three days, regardless of achievement levels. However, virtual absenteeism showed no similar impact, highlighting distinct absenteeism dynamics in virtual environments. Amid COVID-19 disruptions, this underscores the need for interventions addressing absenteeism across varied learning settings, offering insights for policymakers and educators in navigating the challenges of both physical and virtual classroom dynamics.

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Excessive absenteeism among K-12 students has long been a concern for educators, policymakers, and researchers due to its significant impacts on academic attainment and social integration. Lower standardized test scores, GPAs, and increased educational disengagement are well-documented consequences of frequent absences (Chang et al., 2018; Chang & Davis, 2015; Author et al., 2010, 2019; Goodman, 2014; Hancock et al., 2013; Connolly & Olson, 2012; Author, 2014). As a response, federal initiatives like the Every Student Succeeds Act (ESSA) and various state- and district-level interventions have been implemented to reduce absentee rates and incorporate absenteeism into school accountability measures (Jordan & Miller, 2017; Hutt, 2018; Author, 2019; Balfanz & Byrnes, 2018).

The emergence of the COVID-19 pandemic has exacerbated the challenges of student absenteeism, introducing new complexities into understanding and addressing its causes and consequences. The shift to remote and hybrid learning models, alongside the health concerns associated with in-person attendance, has dramatically altered attendance patterns and the nature of absenteeism itself (Authors, 2020; Doe & Smith, 2021). This unforeseen shift necessitates a reevaluation of absenteeism within the novel context of a global pandemic, considering how these changes impact academic and social outcomes for students.

The Role of Classroom Dynamics in Absenteeism

Despite considerable focus on school-level factors in addressing absenteeism, the influence of classroom dynamics has remained relatively underexplored. Research indicates that the classroom environment, shaped by teacher behaviors and classmate interactions, plays a significant role in influencing attendance patterns (Gershenson, 2016; Holt & Gershenson, 2019; Ladd & Sorensen, 2017; Liu & Loeb, 2019; Author, 2013, 2014; Authors et al., 2016, 2018). The interactions between

students, as well as the relationship between students and their teachers, can create a learning context that either encourages attendance or exacerbates absenteeism.

To address this gap, our study employs a novel empirical strategy incorporating classroom, student, and critically, date fixed effects to control for daily variations in absenteeism. This methodological approach allows for a more nuanced understanding of how classmates' absences may influence an individual's decision to attend school, offering insights into the dynamics of absenteeism at a previously unattainable level of detail. Given the little research in this area, we focused on the possible influence of children's classmates and asked the following research questions:

1. To what extent are classmates' virtual and in-person absences associated with individual student absences?
2. Do these links between classmates' absences and individual students absences differ by the achievement levels of classmates engaging in absenteeism?
3. Does the timing of when classmates are absent influence individual student absences?

Prior Research

To date, little work has examined the classroom impact on absenteeism, with just a handful of studies examining the effects of teachers on student absences (Gershenson, 2016; Holt & Gershenson, 2019; Ladd & Sorensen, 2017; Liu & Loeb, 2019). A small set of studies have also examined the role of classmate demographics on student absences (Author, 2013, 2014; Authors et al. 2016; Authors, 2018). These studies, however, have not examined classroom absenteeism, but only absenteeism as an outcome. Conversely, other studies have examined classroom absenteeism as the main predictor variable but have not studied how this predicts student absenteeism. For example, studies of the effects of teacher (Miller et al., 2008) and classmate absenteeism (Author,

2011, 2019) have found that an increase in teacher and classmate absenteeism negatively affected student achievement.

To our knowledge, only one study has examined the associations between classroom absenteeism and individual student absenteeism outcomes. Using student and classroom fixed effects, Authors et al. (2020) found that when classmates were absent in the fall semester, this affected other students' absences in the spring semester. While the study examined aggregated semester-level absences (fall versus spring), the limitations of the data meant that it was unable to examine day-to-day classmate absenteeism, which greatly limits our understanding of the ways in which student absenteeism unfolds across the school year. The present study fills in this gap in by exploiting a new empirical strategy yet to be seen in the attendance literature and, in doing so, represents the most detailed level study in the field.

Framework

Aggregately, the above-mentioned studies serve as foreground in two capacities. First, they suggest that aspects of the classroom setting my serve as a source of individual-level absences. Second, they indicate that classroom absences negatively affect student success – and at what point these absences occur in the school year matters for this success (Authors, 2017). The present study combines these lines of thinking by examining absenteeism in the classroom setting and student absenteeism as an outcome.

Our first question is our most broad – inquiring into whether there is a student-to-student relations in absenteeism. Based on the prior research, we hypothesize that as classroom absences increase, so do individual student absences. Conceptually, there are three ways in which this relation might emerge: Academic remediation, behavioral disruption, and classroom instability.

First, students who miss school more often are shown to be academically behind (Authors, 2009, 2017; Gershenson et al., 2017; Goodman, 2014; Ehrlich et al., 2018; Hancock et al., 2013; Liu et al.,

2021; Smerillo et al., 2018). Hence, when absent students return to the classroom, teachers must spend class time remediating these students to catch them up (Author, 2019; Chen & Stevenson, 1995; Finn, 1993; Monk & Ibrahim, 1984). As a result, academic progress slows for the entire class, and this slowdown may be exacerbated as more-and-more classmates miss school (Author, 2019). Consequently, other non-absent students may find the classroom less academically engaging and may, as a result, begin to disconnect and disengage. A lack of engagement has been linked to absenteeism in children (Author, 2011; Broadhurst et al., 2005; Southworth, 1992).

Second, Author (2014) has shown that students who miss school have weaker social skills and increased problem behaviors. This likely emerges given that being away from the classroom decreases feelings of connection to classmates and teachers (Ekstrom et al., 1986; Newmann, 1981). When these absent classmates return to school, the classroom setting might contain more behavioral disruptions and negative interactions (Finn, 1989). If absences occur among more classmates, we might expect an increase in instances of behavioral disruptions and negative interactions in the classroom. This consequently makes the classroom less inviting for other students, thereby making it likely that other students will not want to be in the classroom, increasing others' absenteeism (Author, 2019). Additionally, teachers must devote instructional time to classroom behavioral management rather than teaching, slowing academic instruction, and hence making the classroom less engaging, again leading to absenteeism (Author, 2011; Broadhurst et al., 2005; Southworth, 1992).

Third, research has demonstrated that stable classroom settings can be linked to stronger student outcomes (Juvonen et al., 2012). Classroom stability might mitigate the stress experienced in students' school environments, much like routine functions to minimize stress (Fiese et al., 2010). Yet, when school stability is disrupted – much like when a routine is disrupted – stress and anxiety about school increase, which ultimately raises school-refusal behavior and absenteeism (Author,

2015). As it pertains to this study, one measure of classroom stability is showing up to school and seeing a familiar set of classmates, and particularly so in elementary school where the classroom is the same throughout the day and year (Authors, 2018). When students experience the same set of classmates each day, this becomes a feature of classroom stability (Authors, 2018, 2024). When students experience a different permutation of classmates each day because of classmate absenteeism, this stability becomes disrupted. Frequent changes in the school environment disrupts stability, raises school anxiety, increases desires to avoid school, and hence increases absenteeism (Espelage et al., 2013). Put succinctly, disruption to the learning context can affect all students (Anderson et al., 2000).

It is important to note that teacher absences and behavior can have a classroom level impact on student absenteeism as well. The teacher sets the culture of the classroom and if that culture is inhospitable, fosters a lack of engagement, or the teacher models a high rate of absenteeism student attendance could be affected as a result. These potential impacts make it necessary for us to control for teacher level factors that could impact student achievement. By controlling for teacher influences through classroom fixed effects, we ensure we are able to paint a picture of classroom engagement and absenteeism detached from teacher influence.

Extending this framework to consider virtual absenteeism, our study explores how the dynamics of how absenteeism manifests and impact student engagement in virtual learning environments. We posit that virtual absenteeism may not influence peer attendance patterns in the same direct manner as in-person absences, given the reduced opportunity for social interaction and the inherently different engagement mechanisms. While speculative, virtual classrooms may mitigate some traditional absenteeism effects- such as the immediate impact of peer absences on daily classroom dynamics- yet introduce new challenges. Similarly, the concept of classroom stability takes on new meaning in a virtual setting, where virtual presence and participation metrics become proxies

for physical attendance. Students may already have a higher propensity for increased feelings of isolation and disengagement in virtual formats, and thus peer absenteeism may not be a significant factor in predicting students' attendance. Rather, parental involvement, socioeconomics, teachers, and the design of the online learning environment are arguably more important.

Our second research question asks a more specific question – whether individual absenteeism outcomes differ based on the academic skills of those classmates who were absent. Although the second and third mechanisms mentioned above might not differ based on the academic ability of absent classmates (i.e., behavioral disruption and classroom instability), the first mechanism (i.e., academic remediation) might differ based on ability levels (proxied by achievement) of those absent classmates. If absent classmates are of higher achievement levels, they may not require as much remediation upon their return to school. On the other hand, research suggests that lower achieving students are most hurt when missing school (Aucejo & Romano, 2016). When lower achieving classmates return to school, the need for remediation might be even greater, and this might disrupt regular instructional flow.

Our third and final research question examines the timing of classmate absences. As mentioned previously the only known study on the timing of classmate absences, focused on semester-to-semester patterns (Authors et al., 2020). Additionally, the effect of absences on student outcomes was strongest when the absences occurred close to the outcome (Authors, 2017). Since we know timing can play an important role in student success, it is important to evaluate the effect in regard to timing for classmate's absences. In this study, we were able to obtain a much more refined portrait by examining daily classmate and individual absenteeism measures to measure their impact.

Impact of COVID-19 on Absenteeism and Classroom Dynamics

The COVID-19 pandemic has undeniably reshaped the educational landscape, presenting challenges that have profound implications for student attendance and the efficacy of established

intervention strategies. The transition to online and hybrid learning models has altered the nature of absenteeism, making it more difficult to monitor and address (AttendanceWorks, 2023). This shift has not only altered attendance patterns but has also underscored the need for a deeper understanding of classroom-level dynamics that drive absenteeism post-COVID and in virtual learning environments. Traditional markers of engagement now require new perspectives for action in today's classrooms.

Research during the pandemic has highlighted the increased risk of disengagement and absenteeism, particularly among students facing technological barriers or lacking a conducive learning environment at home (Santibañez & Guarino, 2021). Such challenges exacerbate the risk of disengagement and absenteeism. Furthermore, the social aspects of learning, including peer interaction and teacher support, have been disrupted, potentially increasing feelings of isolation and disconnection from the school community (Larsen et al., 2022).

The Texas Context: Attendance After Initial COVID-19 School Closures

In the 2020-2021 school year, Texas public schools were given the flexibility to offer remote learning options to their students in response to the COVID-19 pandemic, facilitated by guidance and support from the Texas Education Agency (TEA). This allowed students to engage in learning from home, either through a fully remote or hybrid model, as a measure to ensure educational continuity amid health concerns and social distancing requirements.

Transitioning into the 2021-2022 school year, TEA continued to provide options for remote learning but with additional legislative support and specific guidelines. According to TEA's Remote Instruction document (updated 9/29/21), districts could use federal funds or reserve balances for full-time virtual education. The passage of Senate Bill 15 further facilitated state funding for full-time virtual education for average to well-performing districts, allowing them to offer a local remote learning program for up to 10% of the district's enrollment. For instances requiring temporary

remote conferencing due to medical conditions or COVID-19 exposure, districts could offer this mode of learning synchronously for up to 20 instructional days, with the possibility of extension through a waiver request under specific circumstances. Despite these provisions, TEA indicated that missed school day waivers due to COVID-19 closures would not be issued for the 2021-2022 school year, and low attendance waivers were not granted for the first six-week reporting period.

Methodology and Novel Contributions

Our study makes two important methodological contributions addressing key issues of selection bias with respect to isolating the effect of absenteeism, especially as it relates to peer effects. First, we address the concern of unobserved variation based on time of year, days of the year unique to specific schools (e.g., parent-teacher conferences, weather-related events, school closures, etc.). This variation is removed through our incorporation of date fixed effects, where we compare the peer effects of absenteeism by comparing attendance of students based on their peers' absences within a specific day of the year, where all students experience the same potential external factors corresponding to a specific day of the academic year.

Additionally, we leverage these unique datasets that also record whether an absence was recorded for a student whose parents/guardians opted for fully-remote learning during the 2020-21 school year. By differentiating between absences that occur within the traditional physical learning environment and those that happen remotely, we can examine how disruptions to the classroom's physical space versus virtual participation impact student absenteeism. Similarly, we exploit variation in disruptions to the entire classroom or school environment based on attendance data recorded for students whose classrooms or schools were closed due to a COVID-19 outbreak. This underscores the importance of date fixed effects, so that instances like sporadic school closures do not impact our identification of the effect of peer absenteeism that we hypothesize disruptions the physical learning context in elementary classrooms, where students' have consistent interaction with their

peers and teachers. We also investigate whether and how the impact of classmates' absences on a student's likelihood of being absent varies by the achievement levels of the absent classmates and the timing of their absences.

Method

The present study leverages administrative data from four diverse Texas school districts in the 2020-21 and 2021-22 school years, offering a unique perspective on absenteeism during the two years following initial school closures, years when school districts were facing unprecedented disruptions due to the COVID-19 pandemic. These districts provided both remote learning options for students and encountered school closures due to COVID-19. The demographic composition of the student population in these districts was predominantly Latinx (53%), with other students being other race/ethnicity (9%), Black (5%), Asian (4%), and White (29%). A majority of students (77%) were eligible for free or reduced-price lunch, indicating a high level of economic diversity. English learners constituted 17% of the student body, while 8% of students received special education services.

Our dataset includes student-by-year observations across the four districts. We focus on elementary students in grades 4^{th}-5^{th} grades. Our rich dataset includes daily absenteeism logs, demographic information, achievement measures, and teacher demographics, we constructed two analytic samples. The first examines the association of classmate absenteeism on student absenteeism using yearly aggregate measures, consisting of 28,842 student-by-year observations. To delve deeper into the daily-level variation in absenteeism, our second sample expands to 5,133,920 student-by-day observations, enabling an unprecedented analysis of how day-to-day classroom dynamics, influenced by both remote and in-person absences, affect individual student attendance. This approach provides a nuanced understanding of absenteeism's multifaceted nature during a period of significant disruption and adaptation within the educational landscape.

Given these data, we constructed two analytic samples. The first sample consists of N = 25,958 student-by-year observations for students who were considered to primarily attend school in-person. The second sample consists of N = 2,884 students who attended school virtually. We use these samples to examine the association of classmate absenteeism on student observation with yearly aggregate measures of absenteeism. To exploit the daily-level variation in absenteeism, we expanded these samples to consist of N = 4,620,528 student-by-day observations for in-person students and N = 513,392 student-by-day observations for virtual students over the two years. where each observation represents every day a student was enrolled in the district and thus could have been absent from school.

To better understand differential effects of peer absences in in-person vs. virtual learning contexts, we consider days when schools were closed due to a COVID-19 outbreak- or other related challenges such as staffing shortages- as virtual. Consistent with our conceptualization of how peer absenteeism functions differently in in-person and virtual contexts, this allows us to exploit variation within the same subsample of students who experienced both virtual and in-person schooling.

Outcome

We calculated the average daily absence rate for each student, which is the student's total number of absences each year divided by the number of days they were enrolled. After examining student absenteeism at the year-level, we then examine student absenteeism by day, which means the key outcome measure is a binary indicator for whether a student had an absence each day (1=yes/0=no). With the provided data, these measures were bifurcated to represent in-person and virtual absences.

Key Predictor: Classmate Absenteeism

Consistent with the outcome measures described above, our independent variable of interest has two forms based on the analytic sample. When using the student-by-year dataset, classmate

absenteeism was calculated as the average daily absence rate for students' classmates during the school year. More specifically, we divided the total number of absences accumulated among a student's classmates by the sum of the number of days students' classmates were enrolled in school. When using the daily-level dataset, the key predictor becomes the proportion of students' classmates who had an absence from school one day prior.

Differences by Achievement Levels

In addition to the data described above, the district provided standardized testing information for students from the spring of 2021. To examine whether the outcomes of classmates' absenteeism differ based on achievement levels, we matched students' daily absence logs with their previous year's standardized math and reading scores on the standardized State of Texas Assessments of Academic Readiness (STAAR). For this phase of our analysis, the daily-level absenteeism outcome measure remained the same, but we excluded the 2020-21 school year given the lack of achievement data from students' previous year. Then, we separated the classmate absenteeism measure into two independent variables: The proportion of a students' higher or equivalent-scoring classmates who had an absence the previous day and the proportion of a students' lower-scoring classmates who had an absence the previous day.

Differential Effects Based on Timing

Beyond examining how classmate absenteeism one day might influence student absenteeism the next, we also examined how classmate absenteeism one day might influence student absenteeism two, three, and four days later. To do so, we calculated additional variables representing classmate's absence rate from two, three, and four days prior.

Empirical Specification

Baseline model

To address the relations between classmates' absence rate and a student's absence rate, we employed the following linear OLS model:

$$A_{ijkt} = \beta_0 + \beta_1 CA_{ijkt} + \delta_i + \delta_j + \delta_t + \varepsilon_{ijkt}$$

where *A* is the absence rate for student *i* in classroom *j* in school *k* in year *t*. The key predictor is the absence rate of a student's classmates, represented by *CA*. The baseline model includes fixed effects at the student, classroom, and year levels, represented by δ_i, δ_j, and δ_t. All models in this study also control for grade level. In this way, this model controls for all time-invariant student and classroom observed and unobserved variation as well as time trends. Therefore, it was not necessary to include any covariates that do not vary over time (e.g., student race/ethnicity). Note the error term is cluster-adjusted at the classroom-level to account for the fact that student observations are nested within classrooms. This follows recommendations to cluster errors at the level of treatment (Abadie et al., 2017).

Date Fixed Effects

Researchers have established that student absenteeism is a complex and multifaceted issue that has many driving factors, several of which we cannot observe with the current dataset. Timing of absenteeism within the year is particularly variant (Attendance Works, n.d.; Author, 2019, 2020), as weather, school holidays, or even just the day of the week can be predictive of students' propensity to miss school. We use our second analytic sample to account for this day-to-day variation in absenteeism. Exploiting this variation allows us to examine within-day absenteeism, allowing only a student's own absenteeism and their classmates' absenteeism to vary between days. For this analysis, we employ a linear probability model with our day-level dataset:

$$A_{ijkd} = \beta_0 + \beta_1 CA_{ijk(d-1)} + \delta_i + \delta_j + \delta_d + \varepsilon_{ijkd}$$

where date fixed effects, δ_d, subsume the previous year fixed effects indicators. Date *d* represents the date of the school year, such as February 4, 2014. Date fixed effects control for all observed and

unobserved variation from a particular date, such the days leading up to or following a holiday. In the model above, the outcome of interest is a binary indicator for whether a student had an absence that day, as the dataset is now at the daily level. The predictor is the percentage of a student's classmates who had an absence the day prior.

We use this same model to address the second and third research questions. To address the second research question, classmate absenteeism is separated into two variables, each representing the percentage of a student's classmates who were absent that were higher or lower achieving based on the previous year's assessment scores. Lastly, to address the third research question, we supplement the model with additional variables representing the percentage of a student's classmates who were absent two, three, and four days prior.

Results

Outcomes of Classmate Absenteeism

Table 2 presents our empirical specification based on Equation 1, where we tested whether a student's classmate absences predicted students' in-person and virtual absence rate at the year level. For ease of interpretation, we transformed variables so that coefficients represent marginal effects for every 10-percentage point increase in classmate absenteeism. Looking across columns 1-3, we show estimates from build-up regressions that account for an increasing number of observed and unobserved time-invariant factors using fixed effects at the year, grade, classroom, and student levels, respectively.

Looking at Table 2, we show that classmates' in-person absence rate is predictive of a students' in-person absence rate at the year level in every model. Specifically, as seen in column 1, for every 10-percentage point increase in classmates' absence rate, a student' absence rate increases by 1.9 percentage points. After including classroom fixed effects, this estimate increases to 2.4 percentage points as shown in the second column. Then, as seen in the third column, the inclusion

of student fixed effects drops the estimate down to 1.8 percentage points. The next three columns present estimates of the effect of classmates' absenteeism on students' absenteeism in virtual classrooms, including students who were in a virtual classroom all year as well as days when students' schools were closed. While we show that the baseline absenteeism rate is greater, as shown in the constant term, we do not find evidence that virtual classmate absenteeism is predictive of students' absenteeism.

Table 3 presents estimates based on Equation 2, which is a linear probability model using an expanded dataset that tracks student absenteeism at the daily level. Recall the outcome of interest is now whether a student had an absence, and the key predictor is the percentage of a student's classmates who were absent one day prior. As in Table 2, we show estimates with increasing levels of fixed effects. Beginning with column 1, we show that for every 10-percentage point increase in the number of students' classmates who were absent in-person on a particular day, students had a 5.2 percentage point greater likelihood of having an in-person absence the next day. After adding classroom fixed effects, this estimate drops to 3.9 percentage points, and after adding student fixed effects, it drops to 2.8 percentage points. After the addition of date fixed effects, the most rigorous specification, there remains a significant relationship between classmate and student in-person absenteeism. As seen in column 4, for every 10 percentage point increase in the number of a student's classmates absent in-person one day, the student has a 2.6 percentage point higher likelihood of being absent the next day in-person. The next three columns show results for the student-by-day sample but for virtual settings. Consistent with findings displayed in Table 2, we do not find evidence that virtual classmate absenteeism is related to student absenteeism virtually.

To put the magnitude of these associations of in-person absenteeism in context, consider the constants from Tables 2 and 3, which represent the average rate (year-level) or probability (day-level) of student absenteeism holding all else constant. When doing so, we find that if 10 percent of a

student's classmates have an absence one day, that student is nearly twice as likely to have an absence the next day after accounting for all time-invariant grade, classrooms, student, and date-level factors.

Differences by Relative Achievement

To address our second research question, Table 4 shows estimates from the model outlined by Equation 2, except classmate absenteeism is now split into two separate variables: The percentage of a student's higher-achieving classmates who were absent the previous day and the percentage of a student's lower-achieving classmates who were absent the previous day. Similar to Table 3, coefficients represent increases or decreases in percentage point likelihoods of a student having an absence for every 10 percentage points of a student's classmates who were absent the previous day. As seen from Table 4, both variables were statistically significant and similar in magnitude to the general estimates presented in Table 3. That is, the associations between classmate absenteeism and a student's absenteeism does *not* vary as a function of their classmates' achievement. We examined the same associations for virtual students, and our models yielded null results.

Differences by Timing of Absenteeism

The third and final research question asked whether classmate absenteeism might influence student absenteeism beyond just the next day. To examine whether this is the case, we included additional predictors that represent the percentage of classmates who were absent two, three, and four days prior. Beginning with column 1 of Table 5, it appears that the percentage of a student's classmates who had an absence two days prior is predictive of a student's likelihood of having an absence. Specifically, for every 10 percentage points of a student's classmates who had an absence two days prior, a student is 0.9 percentage points more likely to have an absence. Similarly, as shown in column 2, for every 10 percentage points of a student's classmates who were absent three days prior, a student had a 0.6 percentage point increase in their likelihood of having an absence.

However, when extending the analysis to include classmate absences from four days prior, there does not appear to be a statistically significant relation for the three- or four-day lag variables. Of note, it remained that classmate absenteeism from the day prior and two days prior was predictive of student absenteeism in each model.

Sensitivity Analyses

Our framework considers multiple ways in which classmate absenteeism could act as a disruptive element to the classroom context, thus resulting in absences for other students. We focus on differential effects for in-person and virtual absences, as we hypothesized that in-person absenteeism is more disruptive to elementary students' learning context. In the sample that focuses on daily-level attendance, we chose to categorize days where students attended school virtually due to COVID-19 school closures as virtual days. In another specification, we remove these days from the virtual sample and the null findings did not change.

Discussion

The extant literature has underscored the importance of regular school attendance for students' school success. Though these studies have been critical in advancing our knowledge regarding the outcomes of absenteeism, questions remain about the ways in which absenteeism plays out in the classroom and the ways in which the classroom itself can promote (or hinder) increased school attendance. This omission in the literature is problematic because children spend the largest share of the school day in the classroom and, consequently, our knowledge regarding the ways in which absenteeism unfolds has been greatly limited. Our study fills this knowledge gap, and in doing so, three important themes emerge.

To begin, using a fixed effects strategy at the student-date level, the current study was able to address concerns surrounding the extent to which classmates' absences shape individual student absences across the elementary school years. Although prior studies have shown that classmate

absenteeism – in the aggregate – is associated with students' own absences and their school success (e.g., Author, 2011, Authors, 2019), there have been no attempts made to understand how these dynamics unfold across the school year. To that end, our results demonstrate that, across all model specifications, classmates' in-person absences were associated with an individual student's in-person absences. Even in our most stringent analytic specification, we found that students in classrooms with 10% absent in-person classmates were approximately twice as likely to have a in-person absence the following day.

Importantly, when replicating our models to consider classmate virtual absences, we found no significant associations with individual students' virtual attendance. This finding is a significant contribution to the absenteeism literature, highlighting the distinctive nature of virtual learning environments and their impact on students' responses to their classmates' absenteeism. Unlike in-person absences, which can disrupt classroom dynamics and influence peers' attendance patterns, virtual absences seem to operate within a different context where traditional peer influence mechanisms may not be as direct. This suggests that interventions designed to mitigate absenteeism must be tailed to the specific learning environment, recognizing that the factors driving attendance in physical classrooms may not translate seamlessly to virtual settings. Furthermore, this distinction underscores the necessity of exploring more about how engagement, motivation, and connectivity in virtual classrooms contribute to attendance patterns. As educators and policymakers navigate the challenges of remote or hybrid learning, our findings call for a nuanced approach to fostering student attendance and further investigation into the dynamics of absenteeism and peer effects present in virtual classrooms.

The pattern of our findings is of note for two reasons. First, the results imply is that even if students do not experience other barriers to regular school attendance (e.g., transportation, health problems; Author, 2017; Grinshteyn & Tony Yang, 2017), they are potentially at risk for absences as

a function of the absenteeism patterns of their classmates. Documenting such information is critical for intervention and prevention as it points to other key points of consideration when developing tools and programs to mitigate student absenteeism. Thus, when thinking about student absenteeism we must also think about the role of the classroom context. While we recognize teachers play an essential role in setting a tone and culture for the classroom, the effects of peers on student absenteeism should not be ignored. Second, even though much of the policy rhetoric surrounding absenteeism has focused on the older grades (Authors, 2019), our results underscore that these habits emerge in the earliest years of school and are potentially modeled by classmates.

While in the scope of this particular research we could not determine *why* classmate absences link to individual students' absences, we propose three candidate explanations which have possible policy implications. First, prior studies of absenteeism have shown that when more students are absent, teachers spend more time on remediation (Authors, 2019), which may result in student disengagement and absences. If parents sense their child's time at school is being wasted, or that their own child could quickly complete any missed work from an absence they may feel more inclined to allow their child to stay at home on occasion, especially if their children mention other students having been out. However, it is more than just a matter of parents sensing that school could be disengaging. The students themselves when lacking engagement may present refusal behaviors when it is time to go to school which may influence parents to take the path of least resistance and allow them stay home, especially if that parent does not feel attendance is important (Robinson, 2018). If structures were in place to support remediation for students, but not at the expense of the rest of the class, a consistent level of engagement could be maintained. This could be through providing support staff or supporting elementary educators in structuring remediation times primarily during regular small group times instead of taking away from whole group instruction. The second possible explanation stems from the fact that absenteeism has been found to result in greater

behavioral disruptions (Finn, 1989) and, as such, may create an environment that is less inviting for other students. Students returning from an absence may need a "re-entry" time with a counselor, support staff, or faculty mentor that could help them process the struggles of returning to a routine and coach them through what is keeping them from positively engaging in class similar to treatments for students with school-refusal anxiety (Doobay, 2008). These check-ins prior to entering class could promote a soft landing back into the classroom with less anxiety and stress for the absent student and fewer disruptions to peers. Finally, the lack of general classroom stability that stems from absences may result in increased stress and anxiety among students, which raises school-refusal behavior (Author, 2015). It is quite possible that the previous two interventions would return a level of stability to the classroom and mitigate the impact of absences on the anxiety levels of other students. If not, recognizing when others are gone and providing students time to talk as part of a class morning routine could restore a level of normalcy and an avenue of support for students who struggle with daily changes to their peer group, like a morning meeting which can help students develop assertiveness and manage anxiety (Rimm-Kaufman & Chiu, 2007). Although each of these possible explanations and policy implications are speculative and have not been empirically tested, future studies should carefully consider how classroom dynamics change across the school year as a result of student absenteeism and to what extent these changes in classroom dynamics explain the spillover effects of absenteeism. Doing so would provide much needed insight into potential points of intervention and prevention to mitigate the spillover effects of classmate absenteeism. In the meantime, the results of the present investigation make clear is that our understanding of the antecedents and outcomes of school absenteeism is incomplete without considering the role of a student's peers in the classroom.

Even though prior studies have found that school absences are most harmful for lower achieving students (e.g., Aucejo & Romano, 2016), which may imply that higher achieving students

would not require as much remediation upon their return back to school, we found *no* evidence to suggest that the links between classmate absenteeism and student absenteeism varied as a function of their classmates' achievement levels. Contrary to our expectations, it did not matter whether high achieving or low achieving students were absent from the classroom. Both groups of absentees contributed equally to students' risk of being absent in the following days. As such, our findings regarding absent classmates generalize to students across the achievement distribution.

The results from this study make clear that there are lingering 'effects' of classroom absenteeism that persist up to two to three days. This pattern of findings aligns with prior work (Authors, 2017) which found that individual absenteeism was more detrimental for student test scores the closer those absences occurred to the outcome itself. Although this prior work focused on individual absences on individual achievement, a similar pattern has emerged in our study. That is, classmate absences are associated with other students' absences, but only within a certain band of proximity. For school policy and practice, this provides an entry point for schools to identify risk 'hotspots' – i.e., if a classroom experiences an upswing in absenteeism, this may spark further absenteeism among other students. As such, careful attention should be paid to the downstream consequences of classmate absenteeism as these dynamics unfold across the school year.

As with any study, the results of the current investigation should be interpreted in light of its limitations. First, our study sample was restricted to fourth and fifth graders in four Texas school districts. As such, our findings require replication with different samples of students across other grade levels, school districts, and academic years before generalizations are made. Second, in leveraging district data, which provided rich information on daily in-person and virtual absences, information on classroom dynamics and processes that might link classmate to student absences was missing. For example, information on classroom practices, student-teacher relationships, and classmate dynamics were not provided by the district but merit testing as mechanisms that could link

classmate and student absences. This is especially true of virtual environments, where less is known about peer and classroom dynamics. Such studies are a critical next step to understanding the mechanisms that connect classmate to individual student absenteeism. Even though our models employed grade, classroom, student, and date fixed effects, our work is non-experimental. With that said, the questions posed as part of the present study do not readily lend to a large, randomized control trial.

With these limitations and future directions in mind, the results of the present investigation provide some of the most in-depth insight into the spillover effects of classmate absenteeism currently available. Our results underscore the detrimental nature of classmate absenteeism in the classroom context and points to the importance of reducing negative school-going behaviors in the earliest years of school.

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Table 1: Descriptive statistics for main study variables

	In-Person		Virtual		Overall Sample	
	Mean	SD	Mean	SD	Mean	SD
Student characteristics						
Female	0.50	0.50	0.49	0.50	0.49	0.50
Asian	0.05	0.18	0.04	0.18	0.04	0.16
Black	0.05	0.11	0.04	0.10	0.05	0.12
Latinx	0.74	0.43	0.62	0.48	0.71	0.46
Other race	0.12	0.20	0.11	0.19	0.12	0.20
Free or reduced-price lunch	0.78	0.45	0.76	0.42	0.77	0.43
Special education	0.09	0.21	0.08	0.17	0.08	0.18
English learner	0.19	0.31	0.16	0.31	0.17	0.32
Student-by-year observations	25,958		2,884		28,842	

Table 2 : Effect of classmate absences on student absences: Year-level

Absenteeism: In-person vs. Virtual	In-Person			Virtual		
Absence rate: Classmates	0.019***	0.024***	0.018***	0.022	0.035	0.020
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.012)
Constant	0.022***	0.020***	0.017***	0.092***	0.112***	0.098***
	(0.006)	(0.003)	(0.006)	(0.004)	(0.005)	(0.008)
Fixed effects						
Year	X	X	X	X	X	X
Grade	X	X	X	X	X	X
Classroom		X	X		X	X
Student			X			X
Observations	25,958	25,958	25,958	2,884	2,884	2,884

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 3: Effect of classmate absences on in-person student absences: Daily-level

Absenteeism: In-person vs. Virtual	In-Person				Virtual			
Lagged: % classmates absent	0.052***	0.039***	0.028***	0.026***	0.022	0.035	0.020	0.046
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Constant	0.012***	0.012***	0.013***	0.014***	0.102***	0.107***	0.098***	0.089***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fixed effects								
Year	X	X	X		X	X	X	
Grade	X	X	X	X	X	X	X	X
Classroom		X	X	X		X	X	X
Student			X	X			X	X
Date				X				X
Observations	4,620,528	4,620,528	4,620,528	4,620,528	513,392	513,392	513,392	513,392

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 4: Differences based on classmates' achievement

Student absenteeism	
Lagged: % classmates absent in-person, higher score	0.025***
	(0.003)
Lagged: % classmates absent in-person, lower score	0.027***
	(0.003)
Constant	0.013***
	(0.000)
Fixed effects	
Grade	X
Classroom	X
Student	X
Date	X
Observations	2,861,298

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 5: Differences based on timing of classmate in-person absenteeism

Student absenteeism			
Lagged: % classmates absent one day prior	0.014***	0.013***	0.013***
	(0.002)	(0.002)	(0.003)
Lagged: % classmates absent two days prior	0.009***	0.008***	0.009**
	(0.002)	(0.002)	(0.003)
Lagged: % classmates absent three days prior		0.006**	0.004
		(0.002)	(0.002)
Lagged: % classmates absent four days prior			0.001
			(0.003)
Constant	0.012***	0.013***	0.011***
	(0.000)	(0.000)	(0.000)
Fixed effects			
Grade	X	X	X
Classroom	X	X	X
Student	X	X	X
Date	X	X	X
Observations	4620528	4620528	4620528

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05