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Inequity in the Early Years: Student Development Trajectories from Kindergarten to Grade 3

Kindergarten Readiness in Illinois Series

Part 2

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External Review

To ensure that this report's contents are rigorous, accurate, and useful to educators and policymakers with varying levels of background knowledge, IWERC solicits feedback from experts. We thank the following reviewers of this report:

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Kindergarten Readiness in Illinois Part 2

Inequity in the Early Years: Student Development Trajectories in Illinois from Kindergarten to Grade 3

Executive Summary

Children enter kindergarten with different knowledge, skills, and behaviors. These differences are influenced by variations in early childhood learning opportunities and experiences before kindergarten. Kindergarten readiness assessments (KRAs) attempt to measure these differences and shed light on disparities at kindergarten entry in knowledge, skills, and behaviors that may be fundamental for K-12 success. We follow literature that conceptualizes disparities in these "readiness" indicators as the product of unequal opportunities (i.e., unequal resources and investments, systemic racism, and other structures of oppression) for children to learn skills and behaviors before they enter the schooling system (Atteberry, 2021; Carter & Welner, 2013). In the previous report in this series, we documented trends and disparities in kindergarten readiness for Illinois students across three readiness domains (socio-emotional development, language, and math) measured by the Kindergarten Individual Development Survey (KIDS). We examined these trends by a multitude of demographic groups, including by racial/ethnic group, gender, Individualized Education Program (IEP) status, English Learner (EL) status, gender, age, and Free and Reduced-Price Lunch eligibility (FRPL). But what happens as students move through the education system? Do these differences grow, shrink, or remain stable? Since kindergarten readiness has been found to predict later achievement, it is important to identify and address differences early on and ensure that all students have the best opportunity to learn when they enter the K-12 education system, which includes both improving experiences prior to kindergarten for children, as well as ensuring that K-12 schools are prepared to serve students at all levels of readiness.

This study is the second in a series on the KIDS assessment and kindergarten readiness in Illinois. KIDS is a relatively new assessment, and its psychometric properties, including its relationship to prior and later experiences, are still being assessed. In this study, we aim to better understand how differences in KIDS ratings relate to students' later performance on high-stakes standardized tests. This is an important policy question because early assessments in kindergarten can be used to understand student trajectories and the evolution of disparities throughout the K-12 education system. The study is also motivated by research on inequity in early elementary school that documents growing test-score disparities by students' racial/ethnic group and FRPL-status as they progress through elementary school. In line with this work, we ask: how do disparities in readiness / achievement change between kindergarten and third grade? In highlighting differences in outcomes from kindergarten to third grade, we aim to highlight disparities in opportunity in order to extend support, inform instruction, and distribute resources accordingly.

When considering differences in outcomes, it is also important to address differences in inputs or resources. Prior research has established that racial/ethnic disparities are often related to differential access to resources and opportunities like pre-kindergarten and high-quality, adequately funded K-12 schools. Therefore, the next two reports in this series will aim to better understand how early disparities are

shaped by early childhood experiences (such as pre-kindergarten and home visiting programs) and then by K-12 school and district resources.

In this report, we perform an analysis of kindergarten readiness in Illinois and relate it to students' third grade academic achievement. We study two cohorts of Illinois kindergarteners and follow them into third grade using data provided by the Illinois State Board of Education (ISBE). We summarize our key findings below.

Findings:

1. **Disparities appear larger in third grade than in kindergarten:** An analysis of student outcomes suggests that disparities in assessment scores by racial/ethnic group and FRPL-eligibility are larger in third grade (on the Illinois Assessment of Readiness or IAR) compared to kindergarten (on KIDS).
2. **Overall, KIDS predicts performance on standardized achievement tests in Grade 3:** The moderate correlation is in line with other kindergarten readiness assessments. This suggests that KIDS can be a useful tool for teachers and schools to identify emerging skills and behaviors that are important for academic success in later elementary school, and to tailor instruction accordingly.
3. **Kindergarten readiness alone does not guarantee academic success, especially for Black and Hispanic/Latino students and students who are FRPL-eligible:** Even among students who enter kindergarten with similar KIDS scores, Black and Hispanic/Latino students, as well as students who are FRPL-eligible, are less likely to score at or above the state proficiency levels in math and language in third grade.

Kindergarten Readiness in Illinois Part 2

Inequity in the Early Years: Student Development Trajectories in Illinois from Kindergarten to Grade 3

In the previous study in this series (Kiguel et al., 2024), we documented differences in kindergarten readiness among demographic subgroups, including by racial/ethnic group, Free and Reduced-Price Lunch eligibility (FRPL), gender, age, students with Individualized Education Programs (IEPs), and English Learners (ELs). While average kindergarten readiness appeared to improve from the 2017-18 to 2021-22 school years, the disparities between demographic groups were relatively constant. We found that White and Asian students were 15 to 25 percentage points more likely than Black and Hispanic/Latino[1] students to be kindergarten ready in all three domains, and that students who were FRPL-eligible, EL, or had an IEP, were also 15 to 25 percentage points less likely to be kindergarten ready in each of the three domains. We found that older students (in months) were more likely to be kindergarten ready in all domains and that girls were more likely than boys to be kindergarten ready in all domains except math. In this study, we follow students from kindergarten to third grade and document the evolution of disparities in achievement in early elementary school. We offer suggestive evidence of growing inequity in educational outcomes between kindergarten and third grade in Illinois.

We follow literature that conceptualizes disparities in readiness and achievement as opportunity gaps that are the product of unequal opportunities for children before they enter the schooling system (Atteberry, 2021; Carter & Welner, 2013). Previous literature has suggested that students with lower levels of kindergarten readiness may not be able to take full advantage of school-based learning opportunities, which can then lead to greater educational inequity; as such, identifying disparities is a crucial first step towards equity, if it is followed by action to reduce disparities (Duncan et al., 2007). Thus, the goal in identifying differences between groups is to extend additional supports, inform instruction, target interventions and resources, and create opportunities to enhance equity in the education system.[2]

The study examines key aspects of the disparities in kindergarten, as measured by the Kindergarten Individual Development Survey (KIDS), and third grade, as measured by the Illinois Assessment of Readiness (IAR). We explore the magnitude of disparities by comparing assessment outcomes among different demographic subgroups, including racial/ethnic group, FRPL-eligibility, EL status, IEP status, gender, and age, in both time periods. We find that achievement disparities by racial/ethnic group and FRPL-eligibility, as

[1] We follow terminology provided by ISBE (and used by the US Census Bureau) to refer to students' racial/ethnic groups. We recognize that these categories do not fully reflect the diversity of student identities in Illinois. For the sake of brevity, we refer to students classified as Hispanic/Latino as "Latino" in figures and tables in this report. We acknowledge that many students may prefer identities such as Latino/a/x, Hispanic, Latinamerican, Latin-American, and Latin*.

[2] We also acknowledge that kindergarten readiness measures may not measure important student strengths, including strengths that are not properly valued or utilized by K-12 schools. However, documenting such additional strengths is not possible with the data for this study.

measured by these assessments, increase significantly between kindergarten and third grade. For example, the difference between Black and White students' math scores increases from 0.36 standard deviations (SDs) in kindergarten to 1.00 SD in third grade, roughly equivalent to the difference between the 50th percentile and the 84th percentile of achievement.

However, because these two assessments are not designed to be comparable, and there is limited research on the predictive power of KIDS, we also examine the relationship between KIDS and IAR. We ask: To what extent does KIDS predict Grade 3 standardized test scores in math and language (ELA)? After documenting a moderate correlation between the assessments, we proceed to analyze the evolution of disparities in outcomes among students with similar KIDS scores. We find that, even among students with similar KIDS scores, Black students are less likely to be proficient in third grade Math and ELA. Hispanic/Latino students exhibit a similar trend, but their position relative to Black students improves throughout these years. Finally, FRPL-eligible students are also less likely to be proficient in third grade, as compared to their non-FRPL-eligible peers with similar KIDS scores.

Background

Children enter kindergarten with different knowledge, skills, and behaviors. Prior research on kindergarten readiness, including the first report in this series (Kiguel et al., 2024), documents differences in readiness across a multitude of demographic groups, such as racial/ethnic group and FRPL-eligibility. Disparities in educational outcomes are intricately related to race and class, as well as the differing opportunities offered to students (Carter & Welner, 2013; Chetty et al., 2020). Researchers have identified several key factors that contribute to the racial/ethnic disparities in educational outcomes: more affluent White students, on average, have access to better funded and more effective schools (Goldhaber et al., 2015) and are more likely to receive early childhood education opportunities (Ansari, 2017). Further, out of school factors like access to medical care, food insecurity, family stress, and neighborhood characteristics have all been shown to affect student outcomes, with a disproportionate share of Black and Latino children in the US struggling with these (Berliner et al., 2009; Lapointe et al., 2007; Minh et al., 2017).

The focus on readiness and test-score outcomes also obscures the assets and unique strengths of students from minoritized backgrounds, who on average receive lower scores on these assessments. In a seminal article, Yosso (2005) argues for embracing a more diverse interpretation of cultural capital through the lens of community cultural wealth, which explores the unacknowledged and unrecognized cultural wealth of minoritized communities. In our sample, for example, more than 40% of students speak a language other than English at home and nearly half identify with a minoritized racial/ethnic group. Thus, students engage with different languages, cultures, and forms of capital, which may provide them with a unique skillset. While we are not able to adequately capture such assets in our data, these diverse forms of cultural capital may nevertheless lead to success in the long run. Future research could examine these assets and their relationship with later outcomes.

To understand disparities that can affect success in K-12 schooling, the current research focuses on kindergarten readiness and its relationship to later school outcomes. Kindergarten readiness assessments (KRAs) attempt to measure differences in knowledge, skills, and behaviors that are related to school success and to offer the opportunity to examine the variation at kindergarten entry (Jensen et al., 2021). As stated

above, prior research, including our own (Kiguel et al., 2024), has found disparities in readiness across a multitude of demographic groups. For example, Reardon and Portilla (2016) found disparities at kindergarten entry between Black, White, and Hispanic/Latino students that were similar to those detailed in our previous report. But what happens as students move through the education system? Do these differences grow, shrink, or remain stable? Several studies have examined this question. Fryer and Levitt (2004, 2006) focused on understanding disparities in achievement between White and Black students. They found that by controlling for a set of socioeconomic covariates, they could account for most of the difference in kindergarten readiness scores between Black and White students. However, by first grade the disparities were growing and could no longer be explained by socioeconomic variables. In fact, the average difference in achievement between Black students and White students increased by .10 SDs (4 percentile points) each year, between kindergarten and third grade.

Since KRAs became widely adopted, numerous studies have linked them to later test scores, helping to understand differences in outcomes. Herring et al. (2022) were the first to connect state-wide KRA data to third grade reading scores and examine whether the relationship varies by subgroups. The authors found that, even among students with similar kindergarten readiness scores, White students were more likely to be proficient in third grade reading than Black students. These early disparities may have long-term implications. Using labor market data, researchers at Stanford find that kindergarten readiness predicts not only later achievement, but even adult labor market outcomes (Chetty et al. 2011). It is therefore essential to document and address these disparities early on.

KIDS is still a relatively new assessment with many open questions related to its psychometric properties, specifically its relationship to prior and later experiences. This study aims to better understand how differences in KIDS ratings relate to students' later performance on high-stakes standardized tests[3]. This is an important policy question because early assessments in kindergarten can be used to understand student trajectories and the evolution of disparities throughout the K-12 education system[4]. The study is also motivated by research on inequity in early elementary school that documents growing disparities in test-

[3] We acknowledge that standardized tests are imperfect measures of learning and development. Studies show that behavior and measures of socio-emotional development predict long-term outcomes similarly or better than test-scores (Jackson et al. 2023). Further, a vast literature argues that standardized tests are often racially and culturally biased (Bazemore-James et al., 2016) and that related accountability pressures fall disproportionately on students of color (Diamond & Spillane, 2004; Holbein & Ladd, 2017).

[4] Because the IAR standardized assessments begin in Grade 3, there is little information and accountability in Illinois schools between kindergarten and second grade. As a result, there is less information on student development and school quality for kindergarten through Grade 2. Nevertheless, ISBE is currently testing an indicator for early elementary called P-2. This indicator aims to highlight the importance of measuring quality in the early grades. The proposed indicator would represent 5% of elementary school accountability and includes measures of chronic absenteeism, dual language programs, and Grade 3 literacy as measured by grades. See the ISBE accountability website for more details: https://www.isbe.net/accountabilityindicators

scores by students' racial/ethnic group as they progress through elementary school. In line with this work, we ask: how do disparities in readiness / achievement change between kindergarten and third grade? The answers may support policymakers in targeting resources, adopting instructional and curricular changes, and providing further opportunities.

In the next section, we describe the KIDS data and our analytic sample. We then describe the analysis method, followed by results and interpretations. We conclude with a discussion of limitations, contributions, and next steps.

Understanding Disparities in Context

This study reports disparities in outcomes between different student subgroups. Reporting on such disparities is important, especially with a new assessment tool, as we cannot address disparities until they are documented. However, we believe these disparities are best interpreted in light of unequal opportunities and resources, discrimination, and other systemic inequalities within and outside of the educational system. That is, **we always interrogate disparities in outcomes as resulting from differences in resources, investments, and opportunities.** We follow a vast literature that identifies and acknowledges the larger, systemic issues (institutional racism, redlining, discrimination, unequal investments, resources, and opportunities) that both historically and in the present shape these disparities (Berliner, 2009; Carter & Welner, 2013; Chetty, 2018; Ewing, 2018; Katznelson, 2006; Ladson-Billings, 2006).

Following Usher et al. (2023), we encourage our readers (and ourselves) to:

Consider and examine the root causes of the disparities observed in these reports.
Recognize that subgroups face significant differences in access to:

- Pre-K and other early childhood programs
- High-quality K-12 school environments
- Neighborhood and community resources
- Investments and supports from districts and governments

Question what we can do to improve equity in and out of K-12 education.
In line with IWERC's mission, we highlight disparities as a call to action for the education community to address these entrenched systemic inequities. This research seeks to provide data that promotes equity through incremental improvements, innovation, and re-envisioning systems for all learners and dismantling fundamentally unjust systems.

Sources: Castillo & Gillborn, 2022; Usher et al., 2023

Methods

Data

We use data provided by the Illinois State Board of Education (ISBE) with student-level information on kindergarten readiness from the KIDS assessment in Illinois. In the first 40 days of kindergarten, teachers assess all kindergarteners using the KIDS framework. The assessment involves observing, documenting, reflecting, and rating students' development on at least 14 mandatory measures.[5] These measures are combined into scores in three domains of kindergarten readiness: self-regulation and socio-emotional learning, language and literacy, and mathematical reasoning. KIDS is meant to be a formative assessment and is not used for accountability purposes. We combine the assessment data with detailed information on students' demographics, including racial/ethnic group, age, gender, FRPL-eligibility, IEP status, and EL status. To follow students over time, we match KIDS scores with third grade standardized test scores. The IAR is a standardized test administered by the state of Illinois for assessment and accountability purposes. It is administered to students in Grades 3 to 8 in both Math and ELA. We describe the assessment measures in kindergarten and third grade below:

Kindergarten Readiness Domains: In this study, we use the three mandatory kindergarten readiness domains, which are composed of the 14 required measures for teachers to observe and record for all students[6]. We describe the domains in detail below:

- **Domain 1 – Socioemotional Development (SEL/SED):** This domain includes measures related to **self-regulation and socioemotional development**. It is comprised of five measures in two sub-domains. The first sub-domain is approaches to learning and self-regulation (ATL-REG), which includes curiosity and initiative in learning, self-control of feelings and behavior, and engagement and persistence. The second sub-domain is social and emotional development (SED) and includes relationships and social interactions with familiar adults, and relationships and social interactions with peers.
- **Domain 2 – Language and Literacy:** This domain includes five measures related to **language and literacy**. The traditional version, used for the majority of students, includes five measures: communication and use of language (expressive), reciprocal communication and conversation, comprehension of age-appropriate text, phonological awareness, and letter and word recognition. An alternative measure for ELs substitutes measures LLD 8 (phonological awareness) and LLD 9 (letter and word knowledge), with alternative measures LLD 1 (receptive understanding of language) and LLD 10 (emergent writing). These measures are more relevant – and better capture emerging English language development – for children who speak another language at home.

[5] "Illinois Kindergarten Individual Development Survey Report." 2023. SY2023. ISBE. https://www.isbe.net/Documents/IL-KIDS-Report-2022-2023.pdf.

[6] For a review of the different KIDS domains, measures, and timelines, see the first report in the KIDS series (Kiguel et al., 2024).

- **Domain 3 – Math**: This domain is composed of four measures related to **math and cognitive reasoning**. These are: classification, number sense of quantity, number sense of math operations, and shapes.

KIDS Scores: The KIDS scores for each domain were provided by ISBE. The score in each domain is based on a combination of ratings for the 14 required measures. To make them comparable over time and to the IAR, we standardize KIDS scores to mean zero, unit variance.

Kindergarten Readiness: The indicator of kindergarten readiness in each domain was also provided by ISBE. This indicator is based on a threshold of KIDS scores. We use this measure to document the share of students who are above the kindergarten readiness threshold in each domain.

Third Grade Test Scores: The IAR is the state assessment administered in the Spring to all Illinois students between Grades 3 and 8 in public school districts, since 2015. Students are assessed in ELA and Math. The measure is used for accountability and also provides insight for policy and researchers (ISBE, 2024). We use students' scores, standardized to mean zero, unit variance for comparability with KIDS scaled scores.

Third Grade Proficiency: The indicator of proficiency in third grade Math and ELA was also provided by ISBE. It is based on a threshold of scale scores. We use this measure to show the share of students who are above the threshold for proficiency in third grade in Math and ELA.

For this study, we follow two cohorts of kindergarteners. We follow the first cohort from their kindergarten year (2017-18) and link their scores and demographics to their third grade IAR in 2020-21. The second cohort attended kindergarten in 2018-19 and third grade in 2021-22. Our main analytic sample includes all students with valid Math and ELA scores in kindergarten and third grade. This involves 70,738 students in the first cohort and 97,608 students in the second. We include summary statistics for the analytic sample in Table 1. Since participation in IAR tests was lower than usual in the 2020-21 school year, we include a robustness test in Appendix Figure A1. In this test, instead of using students' third grade test scores from 2020-21, we use their fourth grade test scores from 2021-22, which had a higher participation rate. We show that the lower participation rate in 2021 does not meaningfully alter the results.

Our sample includes 168,346 students across 1,893 schools in 754 school districts in Illinois. Among the sample, 49% are female, and the average age at KIDS assessment is 65.7 months. In terms of racial/ethnic group, 52% of students in the sample are White, 14% are Black, 24% are Hispanic/Latino, 5% are Asian, 4% identify with two or more races, 0.2% are American Indian or Alaska Native, and 0.1% are Native Hawaiian or Other Pacific Islander. In their kindergarten year, 45% of students were FRPL-eligible, 21% were ELs, and 10% had an IEP. There were also large differences in FRPL and EL status by racial/ethnic group: 78% of Black students and 68% of Hispanic/Latino students were FRPL-eligible, compared to only 24% of White students. Meanwhile, 58% of Hispanic/Latino students and nearly half of Asian students were ELs, compared to only 6% of White students.

Table 1. Descriptive statistics for the analytic sample.

	American Indian or Alaska Native	Asian	Black	Hispanic/ Latino	Native Hawaiian or Other Pacific Islander	Two or more races	White	All
Female	0.48 (0.50)	0.49 (0.50)	0.50 (0.50)	0.50 (0.50)	0.41 (0.49)	0.49 (0.50)	0.49 (0.50)	0.49 (0.50)
English Learner	0.43 (0.50)	0.49 (0.50)	0.04 (0.18)	0.58 (0.49)	0.26 (0.44)	0.06 (0.23)	0.06 (0.24)	0.21 (0.40)
IEP	0.07 (0.25)	0.06 (0.25)	0.09 (0.28)	0.11 (0.31)	0.12 (0.33)	0.11 (0.31)	0.10 (0.30)	0.10 (0.30)
FRPL-eligible	0.63 (0.48)	0.24 (0.43)	0.78 (0.41)	0.68 (0.47)	0.39 (0.49)	0.46 (0.50)	0.28 (0.45)	0.45 (0.50)
Age (months)	65.71 (3.65)	65.57 (3.61)	65.63 (3.61)	65.62 (3.64)	65.57 (3.49)	65.71 (3.69)	65.90 (3.74)	65.77 (3.69)
N (% of total)	413 (0.2%)	8,464 (5.0%)	23,106 (13.7%)	40,889 (24.3%)	155 (0.1%)	7,235 (4.3%)	88,084 (52.3%)	168,346 (100.0%)

Note: Means, with standard deviations in parentheses.

Analysis

The empirical method has two parts. First, we document the distribution of KIDS and IAR scores and examine the evolution of disparities between kindergarten and third grade. To do this, we plot the difference in average scores by subgroups such as racial/ethnic group, FRPL-eligibility, EL status, IEP status, gender, and age, in standard deviations. This allows us to compare the magnitude of the disparities over time and between different assessments.

Second, we consider the relationship between KIDS and IAR: Does KIDS predict later outcomes? Do students' KIDS scores help explain the disparities by racial/ethnic group that we observe in Grade 3? To answer these questions, we plot students' Grade 3 IAR Math and ELA scores by their KIDS scores. To help illustrate and ease interpretation, we follow Herring et al. (2022) and divide students into quintiles based on their KIDS score, then plot the proportion of students in each quintile that will go on to be proficient in third grade.

Third, we examine the relationship between KIDS and third grade IAR separately by racial/ethnic group and FRPL-eligibility. We document the likelihood that students of different racial/ethnic groups will meet the set proficiency levels in third grade, among students who were scored similarly in kindergarten readiness. We compare these probabilities for students in each quintile by racial/ethnic group and FRPL-eligibility. Because students of different racial/ethnic groups may have different KIDS scores even within quintiles, we also examine the relationship continuously.

Findings

Finding 1: Disparities appear larger in third grade than in kindergarten – An analysis of student outcomes suggests that racial/ethnic disparities in assessment scores are larger in third grade (IAR) compared to kindergarten (KIDS).

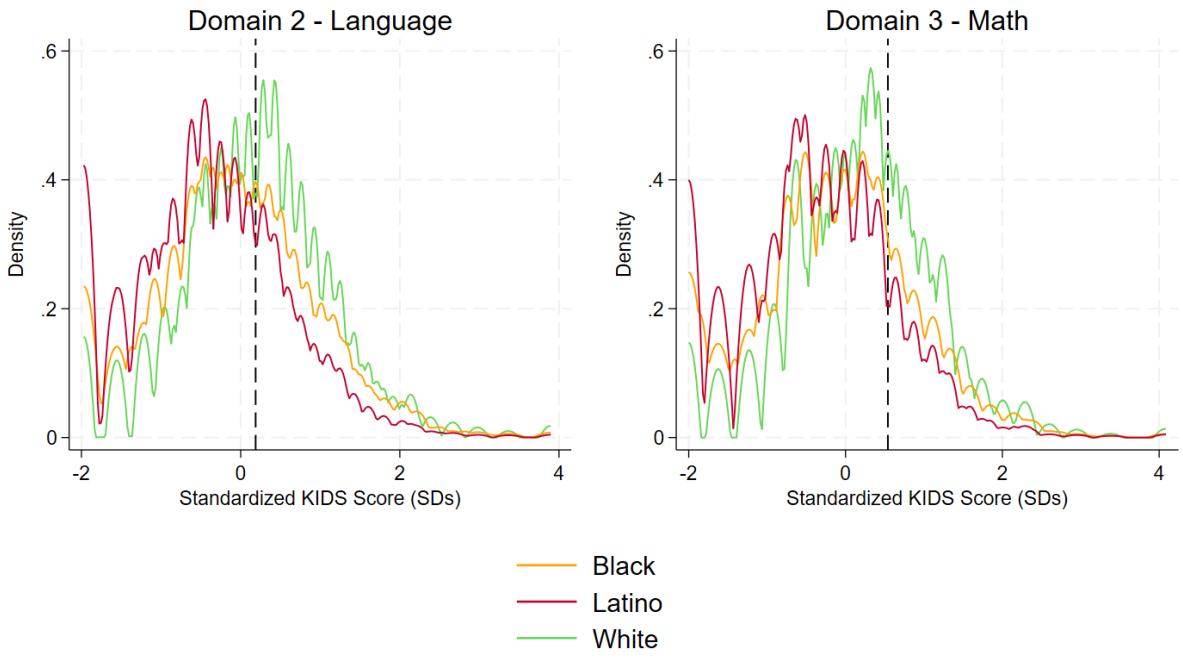
In the previous report, we documented differences in kindergarten readiness by racial/ethnic group, EL status, FRPL-eligibility and other variables (Kiguel et al., 2024). In this section, we show that these disparities continue to grow among many demographic groups in the early years of elementary school. First, we explore the question of how disparities, as captured by KIDS and IAR assessments, evolve between kindergarten and Grade 3. We first examine the distribution of KIDS scores by racial/ethnic groups[7] in Figure 1 and third grade IAR in Figure 2. It should be noted that all the racial/ethnic groups are represented throughout the distributions, albeit at different proportions. In kindergarten (Figure 1), White students are somewhat more likely to be in the upper half of the distribution, while Black and Hispanic/Latino students are less likely to be rated highly on the KIDS assessment. However, by Grade 3, the distributions by racial/ethnic group show significantly less overlap. That is, the differences in scores between racial/ethnic groups appear to be more pronounced. Below, we quantify and compare the average magnitude of these disparities by racial/ethnic group, as well as EL status, FRPL-eligibility, gender, IEP status, and age, between kindergarten and third grade.

We document differences in KIDS scores between racial/ethnic groups in kindergarten and then compare the magnitude of these differences among the same students when they are in third grade. In Fall of kindergarten, White children score higher, on average, than Black and Hispanic/Latino students on all 3 domains of KIDS. For example, in Language, White students score on average 0.19 SDs above the mean (57th percentile), while Black students score almost 0.1 SD below the mean (46th percentile), followed by Hispanic/Latino students who score on average 0.38 SDs below the mean (35th percentile).

The story is similar for Math, with White students scoring almost 0.2 SDs above the mean (58th percentile), compared to Black students, who score 0.17 SDs below the mean (43rd percentile), and Hispanic/Latino students at 0.38 below the mean (35th percentile). In other words, at the start of kindergarten, the disparity in assessment scores between Black and White students is already 0.28 SDs for Language and 0.35 SDs for Math (11 and 15 percentile points, respectively). The difference between White and Hispanic/Latino students is somewhat larger, on the order of 0.56 SDs for both Language and Math (21 percentile points). It should be noted, however, that despite the early disparities, there is significant overlap in the distributions. That is, students of all racial/ethnic groups score in both the lowest and highest developmental categories of the assessment, though the proportions vary.

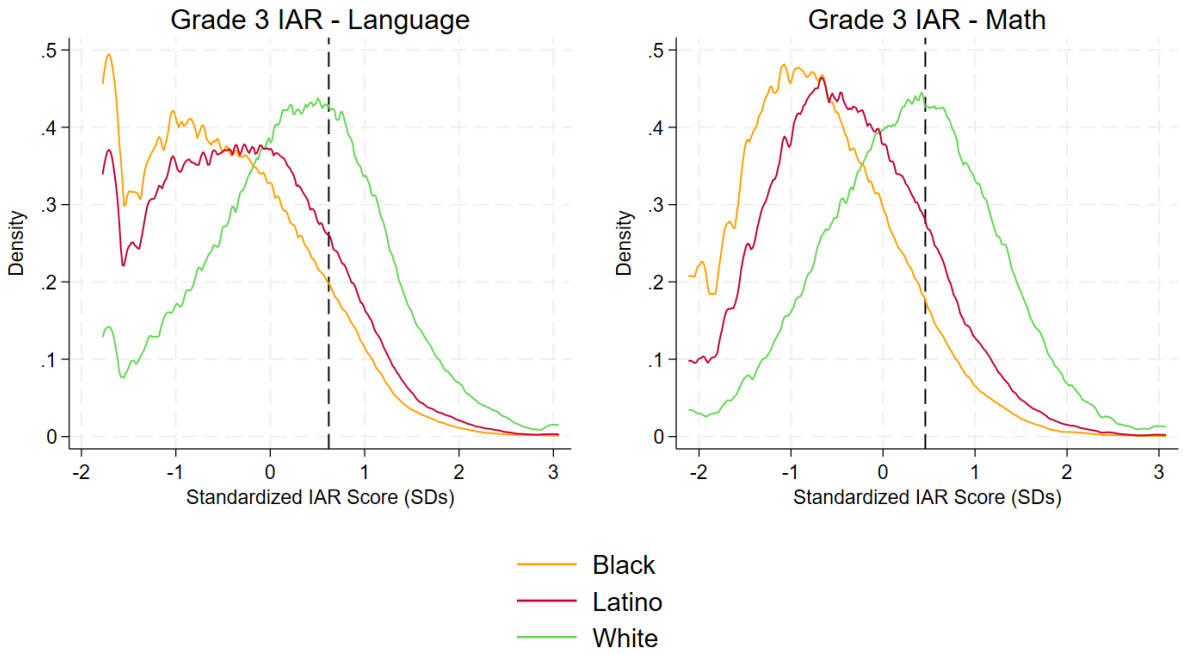
[7] We focus our analysis on White, Black, and Hispanic/Latino students because these are the largest racial/ethnic groups in Illinois schools (90.3% of our sample) and the focus of most of the research on educational inequity.

Figure 1. Distribution of standardized KIDS scores by racial/ethnic group by domain.



Note: Vertical line indicates kindergarten readiness threshold for each domain

Figure 2. Distribution of standardized Grade 3 IAR scores by racial/ethnic group by subject.

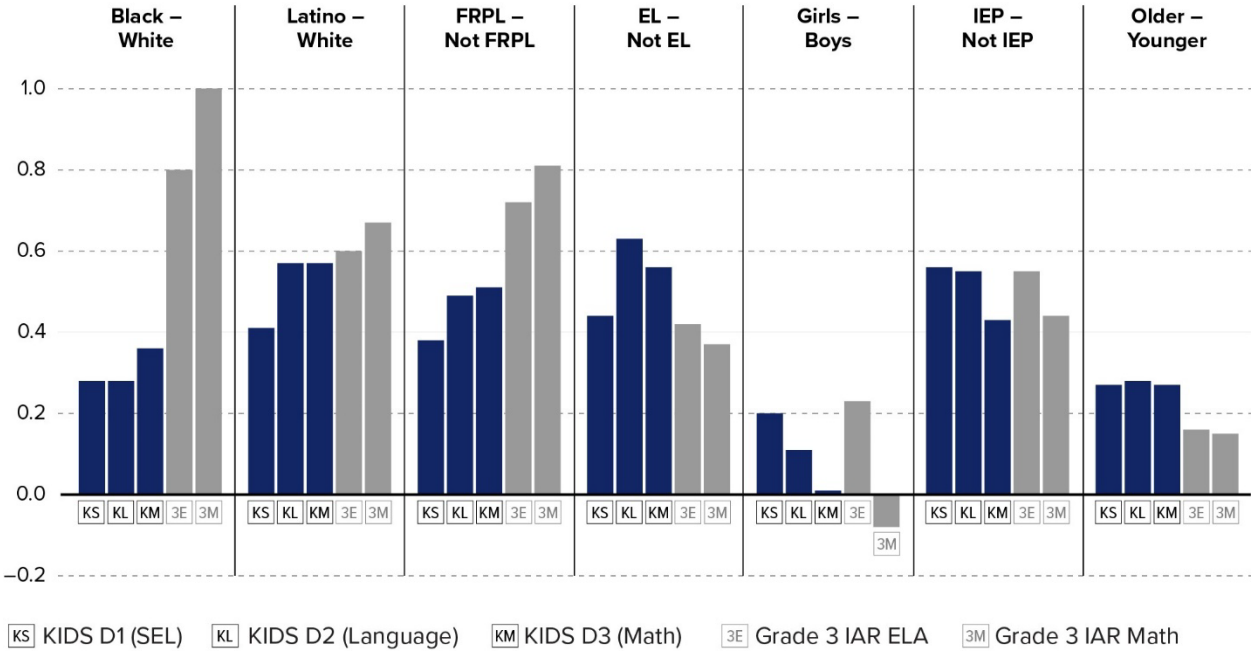


Note: Vertical line indicates proficiency threshold for each subject

By third grade, the differences in assessment scores by racial/ethnic group are considerably larger than kindergarten. On the one hand, White students also continue to score above average, at 0.29 and 0.25 SDs, respectively (61 and 60th percentiles). Hispanic/Latino students score 0.38 and 0.35 SDs below the

mean (35th and 36th percentile), followed by Black students who score 0.7 and 0.55 SDs below the mean (24th and 20th percentiles), respectively. Interestingly, Hispanic/Latino students, who scored lowest on average in kindergarten, gain ground compared to Black students by third grade. As shown in Figure 3, the disparities between Black and White students continue to grow: the difference grows from 0.28 to 0.8 SDs (from 11 to 29 percentile points) in Language, and from 0.36 to an entire 1 SD in Math (from 14 to 34 percentile points). The difference between Hispanic/Latino and White students, meanwhile, scarcely changes, from 0.56 to 0.6 in Language (from 21 to 23 percentile points), and from 0.56 to 0.67 in Math (from 21 to 25 percentile points).

Figure 3. Magnitude of disparity (SDs) by assessment and domain for different student demographic groups.



Next, we consider disparities in scores by FRPL-eligibility. Similarly to the difference between Black and White students, the disparities by FRPL-eligibility also grow between kindergarten and third grade. In kindergarten, students who are not FRPL-eligible score on average 0.22 SDs above the mean in Language (59th percentile) and 0.25 SDs above in Math (60th percentile). Meanwhile, FRPL-eligible students on average score 0.27 SDs below the mean in Language (39th percentile) and 0.39 SDs below in Math (35th percentile). This amounts to a difference of 0.49 and 0.51 SDs (18 and 19 percentile points), respectively. Importantly, these differences appear to have grown in a meaningful way by third grade: In this time, the average score for non-FRPL-eligible students rises in the test-score distribution by 0.1 of a standard deviation in both subjects (4 percentile points), while scores for FRPL-eligible students fall 0.12 and 0.16 SDs (5 and 6 percentile points), respectively. By third grade, the difference between these two groups has grown from 0.49 to 0.72 SDs in Language (from 18 to 26 percentile points) and from 0.51 to 0.81 SDs in Math (from 19 to 29 percentile points).

The trend for ELs offers a more optimistic outlook. In contrast to the results we have examined thus far, the disparities in assessment scores for ELs shrink over time. It is important to note that these are students who were screened as ELs in kindergarten, though many have demonstrated their English Language proficiency by third grade. (We document the results separately for students who are still ELs in third grade compared to those who tested out in Appendix Table A1). While ELs scored below their non-EL peers in kindergarten by 0.63 SDs in Language (24 percentile points) and 0.56 SDs in Math (21 percentile points), by third grade the difference shrinks somewhat to 0.42 and 0.37 SDs (16 and 14 percentile points), respectively. As seen in Table A1, ELs who test out between kindergarten and third grade scored just below the mean in kindergarten but scored 0.1 SD (4 percentile points) above their non-EL peers in third grade. Meanwhile, ELs who had not demonstrated their English Language proficiency were rated significantly lower than their never-EL peers in kindergarten readiness domains (between 0.55 and 0.78 SDs, or between 21 and 28 percentile points) and scored lower in third grade Math and ELA (0.6 and 0.56 SDs, respectively).

We also consider differences between students with and without IEPs. Students with IEPs score between 0.5 and 0.4 SDs below the mean (31st and 34th percentile), on average, in kindergarten assessments. The difference between non-IEP and IEP students is 0.55 SDs in Language (21 percentile points) and 0.43 SDs in Math (17 percentile points). In third grade, the disparities are nearly identical: 0.55 SDs in Language and 0.44 SDs in Math.

Finally, we document differences by gender and age. In kindergarten, girls score 0.11 SDs higher than boys (4 percentile points), on average, in Language, but almost identically to boys in Math. Interestingly, the difference is largest in SEL: boys score lower than girls by 0.2 SDs (8 percentile points) in this domain in kindergarten. By third grade, the gender disparity has grown in Language (0.23 SDs or 9 percentile points) and reversed in Math: now, boys on average score slightly higher than girls, by 0.08 SDs (3 percentile points). To understand differences by age, we divide the sample into those 66 months and older, and those under 66 months, at the time of KIDS assessment. This splits students roughly evenly into those older than average and those younger than average. In line with prior work, we find that the older group leads the younger group in all 3 domains by 0.27 to 0.28 SDs (11 percentile points) at kindergarten. However, by third grade, the magnitude of the disparity is smaller, with the older subgroup leading by only 0.16 and 0.15 SDs (approximately 16 percentile points) for Language and Math, respectively. This is aligned with research showing that the importance of age within a school-grade becomes smaller over time (Peña, 2022).

In examining these differences over time, some disparities appear larger in third grade compared to kindergarten, while others appear similar or even smaller. Nevertheless, it is critical to consider that these are different assessments. As such, they may have different measurement properties and may differently capture students' knowledge, skills, and behavior. Since one is based on teacher observations and the other on a written examination, it is possible that the assessments are more or less able to differentiate between students' skills, development, and behavior. Finally, because there are still open questions about the validity of KIDS, and it was not designed to be comparable to the IAR, we urge readers to be cautious in interpreting the evolution of disparities.

Next, in order to better understand the relationship between the assessments, and also to compare disparities in outcomes among students with a similar baseline, the next sections examine whether KIDS predicts Grade 3 IAR scores, and whether the relationship varies by racial/ethnic group.

Finding 2: Overall, KIDS predicts performance on standardized achievement tests in Grade 3. The moderate correlation is in line with other kindergarten readiness assessments. This suggests that KIDS can indeed be a useful tool for teachers and schools to identify emerging skills and behaviors that are important for academic success in later elementary school, and to tailor instruction accordingly.

Next, we explore the question of whether KIDS predicts IAR assessment scores. This is an important question for many reasons. First, because KIDS is an observational tool based on teacher ratings, it is essential to establish whether it adequately captures dimensions of learning and development that matter in the future. Thus, we aim to understand to what extent KIDS predicts Grade 3 test-score outcomes. In this early stage of KIDS implementation, we suspect that moderate correlation would be suggestive that kindergarten readiness as measured by KIDS is a useful tool for understanding the development of students, and that it may be used to tailor instruction, distribute resources, and potentially change trajectories towards more equitable outcomes. If the relationship were close to zero, then we may be tempted to question whether KIDS is picking up on knowledge, skills, and behaviors that matter for success in later elementary school. Over time, however, one might hope that a moderate correlation would become closer to zero, as teachers and schools use KIDS to tailor instruction and extend supports that allow students of all readiness levels to achieve their potential throughout elementary school.

The first question is whether KIDS predicts later outcomes. That is, do students who are rated highly on KIDS, on average, also score more highly on the IAR in third grade? We present a scatterplot with the relationship between KIDS scores and third grade IAR scores in Figure 4. The figure reveals a moderate positive correlation ($r = 0.44$ for Math and $r = 0.42$ for ELA), with students who perform better on KIDS also scoring higher on IAR.

To help illustrate the relationship in a practical way, we show the percentage of students proficient in third grade Math and ELA based on their KIDS scores in Figure 5. As seen below, among students in the top quintile (Quintile 5, the top 20%) of KIDS Math, 58% are proficient in Grade 3 Math. Conversely, students who score in the bottom 20% of KIDS Math (Quintile 1) are much less likely to be proficient in third grade: only 13% score above the threshold. The relationship is similar for Language: among the top quintile of KIDS Language, 50% of students go on to be proficient in third grade Language, compared to only 9% of those in the bottom quintile.

In sum, KIDS is moderately correlated to third grade IAR scores in Math and ELA. That is, on average, students who are rated higher on KIDS are also more likely to score at or above proficiency in third grade. This is true for both Math and ELA.

Figure 4. Relationship between KIDS Math and Language scores and Grade 3 test scores in Math and ELA.

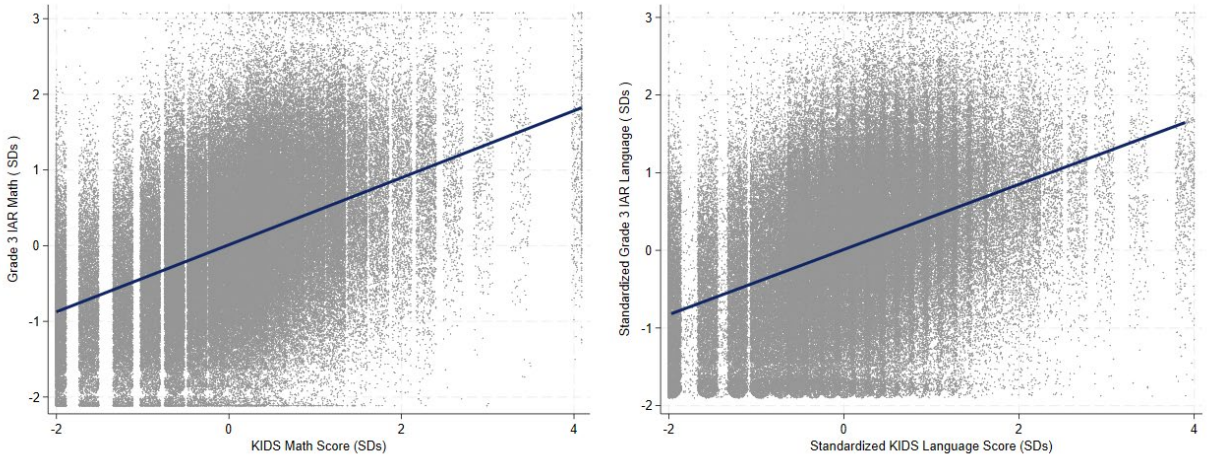
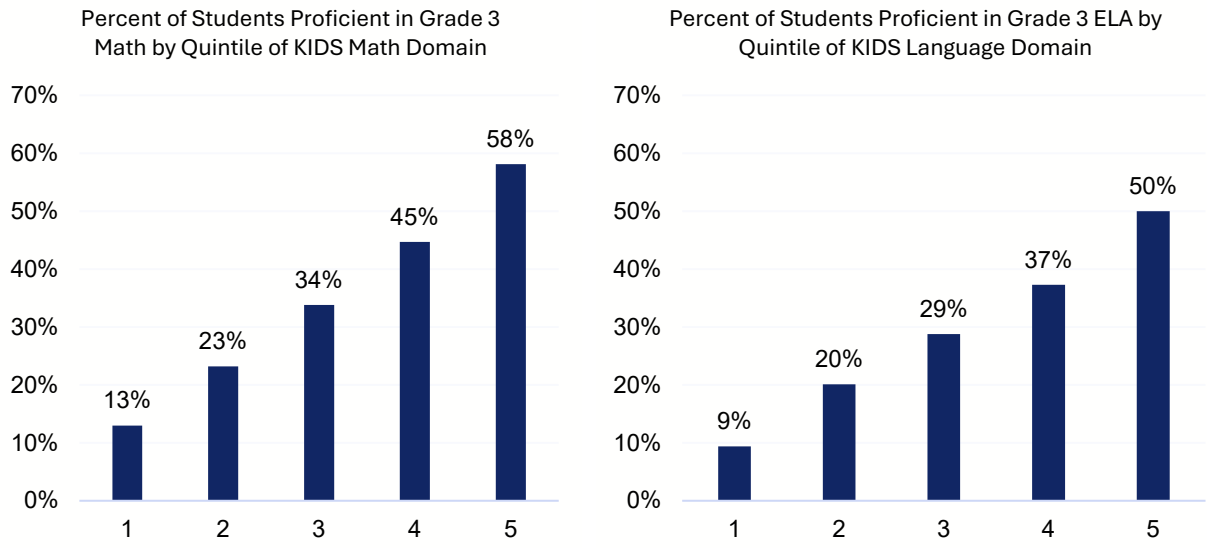


Figure 5. Percent of students proficient in Grade 3 by KIDS scoring quintile.



Finding 3: Kindergarten readiness alone does not guarantee academic success, especially for Black and Hispanic/Latino students and students who are FRPL-eligible. Even among students who enter kindergarten with similar KIDS scores, Black and Hispanic/Latino students, as well as students who are FRPL-eligible, are less likely to score at or above proficiency in third grade.

Following the methods used by Herring et al. (2022), we use the predictive power of KIDS to better understand the growing disparities between kindergarten and third grade for students of different subgroups. For the sake of interpretability, we conduct this exercise between the three largest racial/ethnic groups in our sample, and on which the equity discussion has focused: Black and Hispanic/Latino students, as compared to their White peers. We also examine students who are and are not FRPL-eligible.

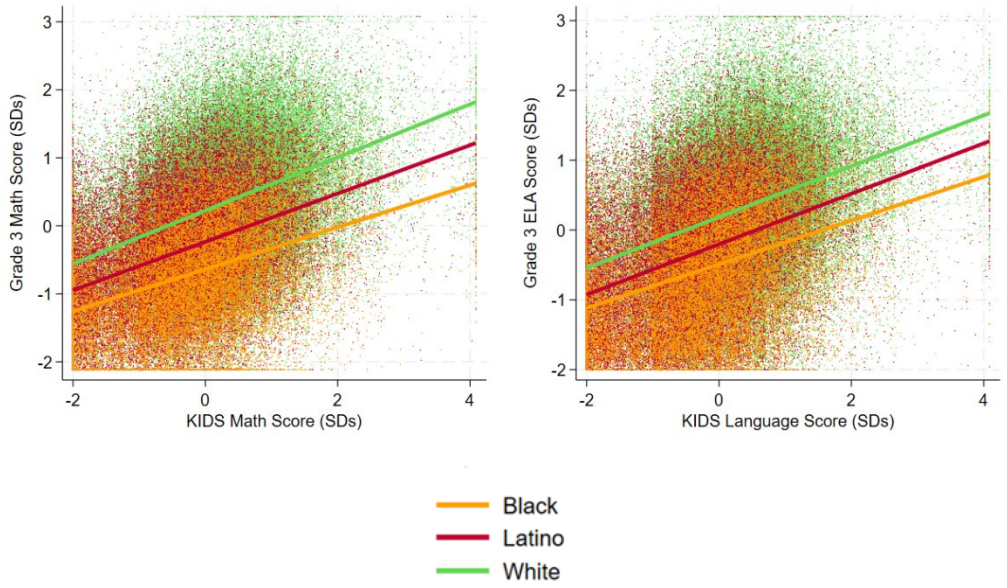
First, we show the correlation of KIDS and third grade IAR across the racial/ethnic groups we discuss (Table 2). The correlations are remarkably similar across racial/ethnic groups and subjects, between 0.4 and 0.38. In other words, KIDS scores are similarly predictive of third grade outcomes across racial/ethnic groups.

Table 2. Correlation between KIDS and Grade 3 IAR separately by racial/ethnic group.

	Correlation	
	Math	ELA
Black	0.39	0.38
Latino	0.4	0.39
White	0.4	0.38

Second, we show that even with similar KIDS scores, Black and Hispanic/Latino students on average have lower standardized test scores than White students in third grade. In other words, if we use KIDS as a baseline, it appears that disparities by racial/ethnic group are growing in early elementary school. We estimate the relation between KIDS and third grade separately by racial/ethnic group in Figure 6. Each line in this figure represents the relationship for a racial/ethnic group. According to the data, a White student who performs average in KIDS Math will, on average, score 0.25 SDs above the mean in third grade Math. Meanwhile, a Black student, with the same score, will instead, on average, score 0.65 SDs *below* the mean – a difference of 0.90 SDs. Finally, Hispanic/Latino students fall in between, with an average third grade Math score of 0.2 SDs below the mean. The pattern for ELA follows a similar trend. In other words, while KIDS is similarly predictive of third grade test scores for White, Black, and Hispanic/Latino students, the outcomes for each racial/ethnic group are different.

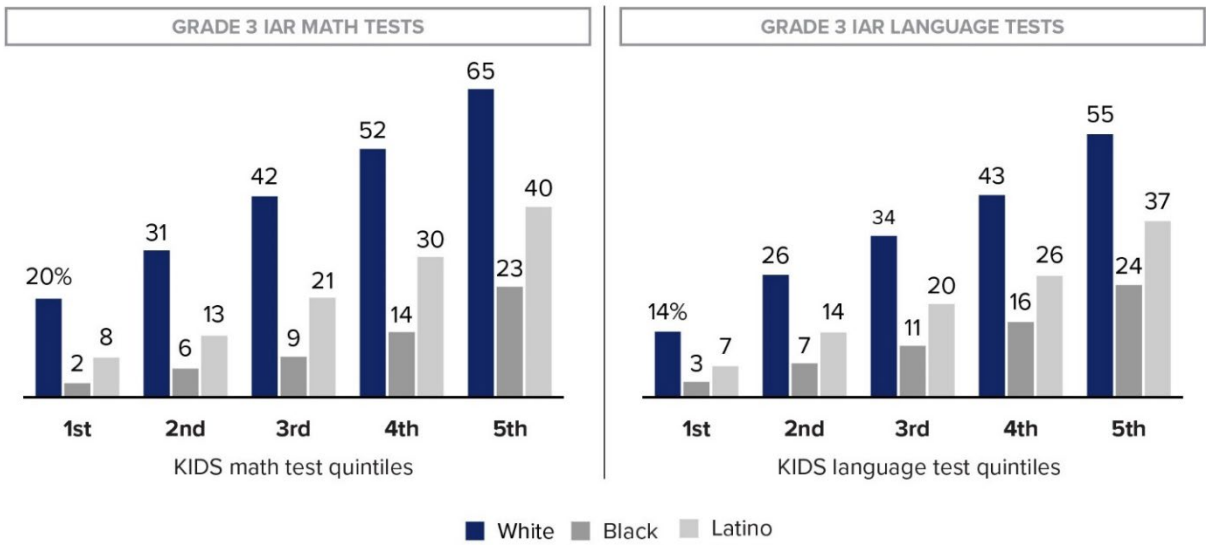
Figure 6. Relationship between KIDS Scores and Grade 3 test scores by racial/ethnic group.



In order to simplify the interpretation of these results, we present the percentage of students proficient in third grade Math by KIDS quintile separately by select racial/ethnic groups in Figure 7. The figure is identical to Figure 6 above but breaks down the proportions of students who reach proficiency by racial/ethnic group. (We document the percent of White, Black, and Hispanic/Latino students in each quintile in Appendix Table A2). The patterns reveal large differences in third grade outcomes for students starting from a similar point in kindergarten.

Figure 7. Relationship between KIDS quintile and Grade 3 proficiency by racial/ethnic group.

Percent proficient, %



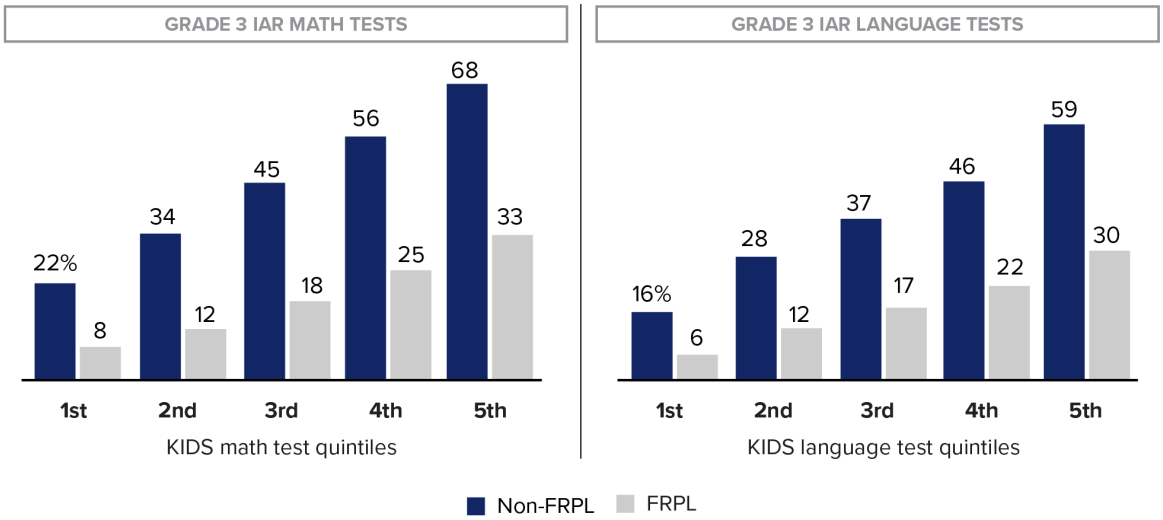
We document that among students with similar KIDS scores, Black and Hispanic/Latino students are less likely to have scores at the state proficiency levels in third grade Math and ELA, relative to White students. That is, the third grade proficiency rate, conditional on KIDS quintile, varies significantly by racial/ethnic group. For example, among students in the top quintile of the KIDS Math Domain, 65% of White students would go on to achieve proficiency in Grade 3 Math, compared to 23% of Black students and 40% of Hispanic/Latino students. In other words, among students in the top 20% of the KIDS Math Domain in kindergarten, White students are three times as likely as Black students, and 50% more likely than Hispanic/Latino students, to be proficient in Math in third grade. Among the lowest-scoring quintile, 20% of White students went on to be proficient in third grade Math, compared to only 3% of Black students and 8% of Hispanic/Latino students. Among this group, White students are seven times as likely as Black students and more than twice as likely as Hispanic/Latino students to be proficient in third grade.

The results are similar for Language. Among students who were in the top 20% of the KIDS Language Domain, 55% of White students were achieving proficiency in third grade ELA, compared to 24% of Black students and 37% of Hispanic/Latino students. That is, White students were more than twice as likely as Black students to be proficient in Grade 3 ELA, and nearly 50% more likely than Hispanic/Latino students. Among students in the bottom 20%, 14% of White students were proficient in third grade ELA, compared to 3% of Black students and 6% of Hispanic/Latino students. Among this group, White students are more than four times as likely as Black students and more than twice as likely as Hispanic/Latino students to be proficient.

Finally, we repeat this analysis by students' FRPL-eligibility in Figure 8. The figure shows that, even with similar KIDS scores, FRPL-eligible students are less likely to score at or above proficiency in third grade Math and ELA, compared to their non-FRPL-eligible peers. For example, among students in the highest quintile of KIDS, non-FRPL-eligible students are roughly twice as likely to meet third grade proficiency in both Math and ELA. Meanwhile, among students in the bottom quintile of KIDS, we find that non-FRPL-eligible students are approximately three times as likely to achieve proficiency in either subject in third grade.

Figure 8. Relationship between KIDS quintile and Grade 3 proficiency by FRPL-eligibility.

Percent proficient, %



Combined, the illustrations using proficiency and quintiles (Figures 7 and 8) and the analysis using continuous variables (Figure 6) provide evidence that, even among students with similar KIDS scores, Black and Hispanic/Latino students on average score lower in third grade Math and ELA, and are less likely to score at the state proficiency level, when compared to their White peers. Analogously, FRPL-eligible students are less likely to score at or above proficiency in third grade Math and ELA, even with similar KIDS scores. Put simply, disparities between racial/ethnic groups and by FRPL-eligibility appear to be growing in early elementary school in Illinois. Our next reports will examine the role of early childhood experiences like Pre-K and of school resources and quality in explaining these disparities.

Study Limitations

This study aims to document how disparities evolve in early elementary school, between kindergarten and third grade, as measured by the available assessments. However, the nature of the data poses some limitations. First, while prior work assessed the KIDS assessments' reliability and its constructs' internal consistency (Bowdon et al., 2019), it is a relatively new assessment that has not been fully validated[8]. In Report 1, we documented disparities in kindergarten readiness, as measured by KIDS, among different subgroups. We also examined growth in KIDS scores throughout the school year, suggesting readiness skills can develop over time, and that they are malleable by the school environment. While we are not able to independently validate this assessment with a concurrent evaluation or examine its internal scales, we confirm that the trends are in line with other research. We emphasize that, because this is an observational assessment, it is possible that these scores suffer from teacher bias (Gilliam et al, 2016) or other problems, like low inter-rater reliability. However, the moderate correlation between KIDS and Grade 3 IAR suggests that KIDS does indeed pick up on knowledge, skills, and behaviors that are important for academic success later in elementary school.

Second, it is important to note once again that this study compares the evolution of disparities in early elementary school using different types of assessments that are not designed to be strictly comparable. As such, they may have different measurement properties and may differently capture students' knowledge, skills, and behavior. Because one is based on teacher observations and the other on a written examination, it is possible that the assessments are more or less able to differentiate between students' skills, development, and behavior.

A third important caveat to consider is that this study uses data from school years that were affected by the pandemic. If the pandemic had differential effects on student groups (as some research has highlighted), it may lead to an over or underestimation of the disparities between groups. We note that our estimates are aligned in magnitude and direction with prior work on similar assessments and grade levels (Fryer and Levitt, 2006; Herring et al., 2022). Further, participation in assessments was lower during the 2020-21 school year than other years. Therefore, we include a robustness test in Appendix Figure A1. In this test, we compare the relationship between KIDS and students' third grade test scores from SY2020-21 as well as their fourth grade test scores from SY2021-22, which had a higher participation rate. Importantly, we show that the relationship with KIDS scores is almost identical and does not meaningfully change the results.

Finally, it is important to emphasize that both assessments (KIDS and IAR) are imperfect measures of students' learning and development. A focus on current assessments may obscure the assets and strengths of students from minoritized backgrounds. We acknowledge that diverse forms of knowledge, learning, and cultural capital are likely not captured by these assessments. Future research could attempt to measure these and relate them to longer-term outcomes

[8] Some outstanding validity concerns include the assessments' scope of item/test discrimination / differentiation, inter-rater reliability and concurrent validation.

Conclusions and Implications

This study examined the relationship between kindergarten readiness as measured by KIDS and third grade academic achievement (IAR) in Illinois. We follow students over time and offer evidence of growing disparities among groups of children in early elementary school. First, we examined how disparities in assessment scores evolve throughout elementary school. Specifically, we found that in Fall of kindergarten, White children on average scored somewhat higher than Black and Hispanic/Latino students on all 3 domains of KIDS. However, by third grade, the difference in assessment scores by racial/ethnic group is considerably larger than in kindergarten. The same is true of the assessment differences between non-FRPL-eligible and FRPL-eligible students. In contrast, the disparities shrink for ELs. We also document differences by gender and age that are aligned with prior research: girls perform better than boys, on average, in ELA, and the difference grows between kindergarten and third grade. Meanwhile, in Math, boys and girls perform similarly in kindergarten, but boys score higher on average in third grade. Finally, while older students within a grade score higher on KIDS, the difference shrinks by third grade.

We then proceeded to document the relationship between KIDS and third grade test scores among individual students. KIDS is moderately correlated with third grade test scores (0.44 for Math and 0.42 for ELA). This suggests that KIDS captures emerging skills and behaviors that are important for academic success in elementary school. We use the proportion of kindergarteners in each KIDS quintile that becomes proficient in third grade as an outcome to better illustrate the relationship.

Finally, we examine the relationship between KIDS and third grade test scores separately by racial/ethnic group. This analysis shows that, even among students who perform similarly in kindergarten, Black and Hispanic/Latino students score lower on third grade Math and ELA. We again turn to third grade proficiency as an outcome to better illustrate this relationship. We show that, among students in the top 20% of the KIDS distribution, White students are two to three times more likely to score above the state proficiency levels in Math and ELA, compared to Black and Hispanic/Latino students. We perform the same analysis by FRPL-eligibility and find a similar relationship: Non-FRPL-eligible students are two to three times more likely to score as proficient in Math and ELA, compared to FRPL-eligible students with similar KIDS scores.

This study shows that disparities between kindergarten and third grade appear to be growing on several key dimensions: between racial/ethnic groups and by FRPL-eligibility. Meanwhile, differences between EL and non-EL students appear to be shrinking, while differences by gender, age, and IEP status present more nuanced patterns. Future research will aim to examine the causes and correlates of these disparities.

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Appendix

Appendix Table A1. Disparities in KIDS domains and Grade 3 test scores by EL status (extended).

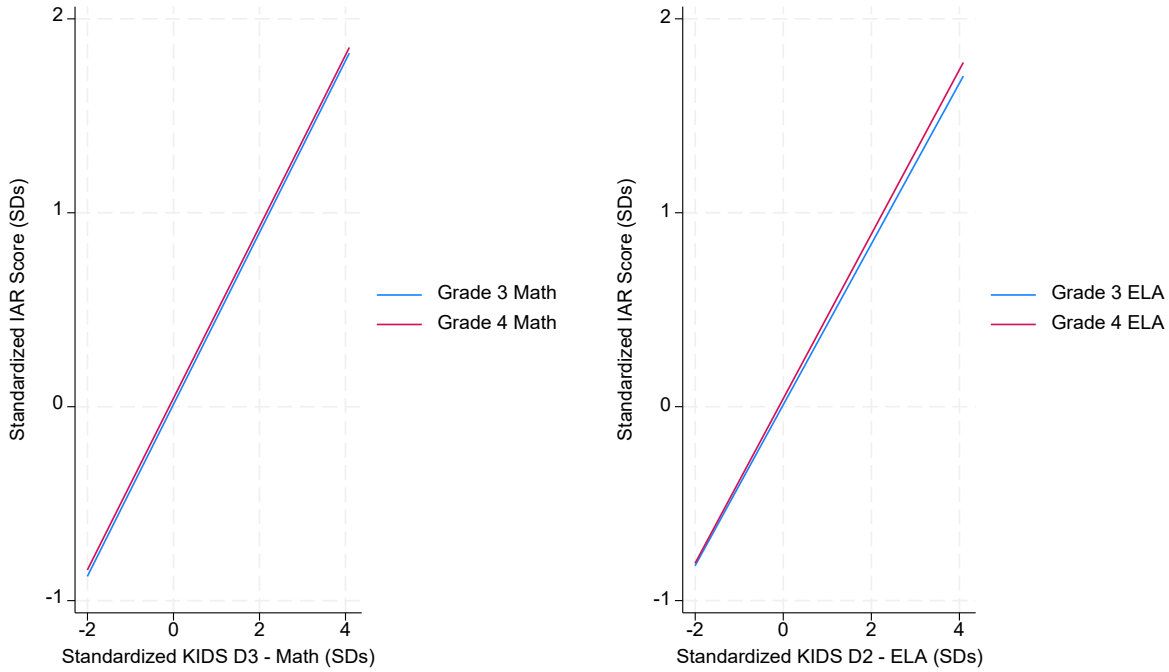
	Average Scores in Standard Deviations			
Variable (Standardized)	Never ELs	ELs (in kindergarten)	Former ELs (ELs in kindergarten but not in Grade 3)	ELs (Throughout K-3)
KIDS D1	0.10	-0.35	-0.02	-0.45
KIDS D2	0.13	-0.50	-0.10	-0.64
KIDS D3	0.12	-0.44	-0.02	-0.58
IAR Grade 3 ELA	0.09	-0.33	0.20	-0.52
IAR Grade 3 Math	0.08	-0.29	0.22	-0.46

Notes: This table documents standardized scale scores in KIDS and IAR Grade 3 by students' EL status. The first column includes all non-EL students, the second includes all students that were EL in kindergarten, the third includes students who were EL in kindergarten but tested out by third grade, and the fourth column includes students who were EL and did not test out by third grade.

Appendix Table A2. Distribution of students by racial/ethnic group by quintile.

% of students in each quintile						
	Language			Math		
Quintile	White	Black	Latino	White	Black	Latino
1	13.75	24.8	34.02	15.72	30.19	37.43
2	19.98	22.78	25.63	20.75	21.27	23.85
3	19.96	17.36	15.78	20.65	18.2	16.49
4	25.27	18.5	15.03	21.94	16.02	12.91
5	21.04	16.56	9.54	20.94	14.32	9.33
Total	100	100	100	100	100	100

Appendix Figure A1. Relationship between KIDS domains and Grade 3 vs. Grade 4 test scores (2017-2018 kindergarten cohort).



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The Illinois Workforce & Education Research Collaborative, a Discovery Partners Institute research unit of the University of Illinois System, conducts rigorous, relevant, and timely cradle-to-career research. IWERC collaborates with community partners to co-construct solutions to pressing issues and ensure informed decision-making leads to statewide equity advancement. IWERC is an applied research initiative of Discovery Partners Institute, which also advances tech talent development and business building in Chicago. With state investment, an innovation district in development, and a high-powered network of university partners regionally and internationally as a part of the University of Illinois System, DPI has the resources to attract, develop, retain, and leverage the most ambitious talent in Chicago to address global challenges in our environment, agriculture, industry, life sciences, and shared digital future.

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