Factors Associated with Grade 3 Reading Outcomes of Students in the Commonwealth of the Northern Mariana Islands Public School System

Few elementary students in the Commonwealth of the Northern Mariana Islands (CNMI) are scoring at grade level or higher on the ACT Aspire reading assessment. To better understand factors associated with the reading proficiency of CNMI grade 3 students, stakeholders there asked the Regional Educational Laboratory Pacific to examine the demographic characteristics and education experiences of students who demonstrated reading proficiency by grade 3. The study focused on grade 3 students who were enrolled in CNMI public schools from 2014/15 to 2018/19. It found that female students, students who did not receive free or reduced-priced lunch, students who were older at the time of kindergarten entry, Filipino students, and students who did not change schools were more likely to demonstrate reading proficiency in grade 3 than other students. There was no difference in grade 3 reading proficiency between students who had enrolled in Head Start and students who had not.

Why this study?

Stakeholders in the Commonwealth of the Northern Mariana Islands (CNMI) are interested in learning more about the factors associated with their students' grade 3 reading proficiency. In spring 2019, 24 percent of CNMI grade 3 students scored at or above reading proficiency benchmarks on the ACT Aspire reading assessment, and school proficiency rates varied from 10 percent to 46 percent.[1] Prior research indicates that meeting reading benchmarks in grade 3 correlates with later academic achievement[2] and postsecondary success.[3] Growing evidence suggests a positive relationship between demographic characteristics and education experiences, such as participation in an early childhood education program like Head Start, and the development of skills and abilities that support students' short- and long-term success, including reading proficiency.[4]

1. Commonwealth of the Northern Mariana Islands Office of Accountability, Research, and Evaluation. (2019). *PSS ACT Aspire targets & annual growth.* Commonwealth of the Northern Mariana Islands Public School System. https://indd.adobe.com/view/ec77fc41-c472-45a1-919f-a6641b1ca544.

2. Gersten, R., Jordan, N. C., & Flojo, J. R. (2005). Early identification and interventions for students with mathematics difficulties. *Journal of Learning Disability, 38*(4), 293–304. https://doi.org/10.1177/00222194050380040301. Hein, V., Smerdon, B., & Sambolt, M. (2013). *Predictors of postsecondary success.* American Institutes for Research College and Career Readiness and Success Center. https://eric.ed.gov/?id=ED555671.

3. Lesnick, J., Goerge, R., Smithgall, C., & Gwynne J. (2010). *Reading on grade level in third grade: How is it related to high school performance and college enrollment?* Chapin Hall at the University of Chicago.

4. Meloy, B., Gardner, M., & Darling-Hammond, L. (2019). *Untangling the evidence on preschool effectiveness: Insights for policymakers.* Learning Policy Institute. Retrieved September 7, 2020, from https://learningpolicyinstitute.org/product/untangling-evidence-preschool-effectiveness-report. Wechsler, M., Melnick, H., Maier, A., & Bishop, J. (2016). *The building blocks of high-quality early childhood education programs.* Learning Policy Institute. Retrieved August 27, 2020, from https://learningpolicyinstitute.org/product/building-blocks-high-quality-early-childhood-education-programs. Yoshikawa, H., Weiland, C., & Brooks-Gunn, J. (2016). When does preschool matter? *Future of Children, 26*(2), 21–35. https://eric.ed.gov/?id=EJ1118535.

The CNMI Public School System aims to support students not only in meeting academic achievement standards but also in acquiring "essential skills for lifelong learning, and ha[ving] the ability to transition into higher education and/or the workforce."[5] Understanding the relationships between its grade 3 students' demographic characteristics and education experiences and their reading performance is of critical interest so that education stakeholders can inform their current improvement efforts for literacy and better prepare their students for academic and life success.

What was studied and how?

The study focused on students who enrolled in grade 3 in a CNMI public school from 2014/15 to 2018/19. It examined the associations between those students' demographic characteristics and education experiences and their grade 3 reading proficiency. Reading proficiency was defined as scoring at or above grade-level benchmarks on the ACT Aspire reading assessment. The study team used hierarchical logistic regression models with a binary outcome (scoring versus not scoring at the benchmark) to estimate the associations. The following research question guided the study:

- Which student demographic characteristics and education experiences were associated with grade 3 reading proficiency?

The study used administrative data from the CNMI Public School System, including data on students' gender, free or reduced-price lunch receipt (a proxy for family income), age at kindergarten entry, ethnicity, enrollment in Head Start, mobility, and performance on the ACT Aspire grade 3 reading assessment.[6]

Findings

- **Female students had a higher probability of demonstrating reading proficiency in grade 3 than male students.** The predicted probability of demonstrating reading proficiency in grade 3 was 18 percent for female students compared with 14 percent for male students, after other student demographic characteristics and education experiences were controlled for. The difference between those probabilities was minor (less than 10 percentage points).

- **Students who received free or reduced-price lunch had a lower probability of demonstrating reading proficiency in grade 3 than students who did not receive this benefit.** The predicted probability of demonstrating reading proficiency in grade 3 was 13 percent for students who received free or reduced-price lunch compared with 19 percent for students who did not receive free or reduced-price lunch, after other student demographic characteristics and education experiences were controlled for. The difference between those probabilities was minor.

- **Older students had a higher probability of demonstrating reading proficiency in grade 3 than younger students.** The predicted probability of demonstrating reading proficiency in grade 3 was 20 percent for students who entered kindergarten at 6 years old (72 months) compared with 10 percent for students who entered at 4 years, 2 months old (50 months), after other student demographic characteristics and education experiences were controlled for. The differences in probability among students who entered kindergarten at other ages were minor, except the difference between the oldest and youngest students at kindergarten entry.

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5. Para. 3 in Commonwealth of the Northern Mariana Islands Public School System. (2021). *Office of Curriculum and Instruction executive summary.* Retrieved September 18, 2020, from https://cnmipss.org/office-curriculum-and-instruction.
6. Because of data quality issues, teacher variables could not be included in the analysis.

- **Filipino students had a higher probability of demonstrating reading proficiency in grade 3 than students of other ethnicities.** The predicted probability of demonstrating reading proficiency in grade 3 was 23 percent for Filipino students compared with 12 percent for Chamorro or Carolinian students and 14 percent for students who reported another ethnicity, after other student demographic characteristics and education experiences were controlled for. The difference in probability between Filipino students and Chamorro or Carolinian students was major (10 percentage points or greater).

- **Head Start enrollment was not associated with grade 3 reading proficiency.** There was no statistically significant difference in grade 3 reading proficiency between students who had enrolled in Head Start and students who had not, after other student demographic characteristics and education experiences were controlled for.

- **Students who attended the same school from kindergarten to grade 3 had a higher probability of demonstrating reading proficiency in grade 3 than students who changed schools.** The probability of demonstrating reading proficiency in grade 3 was 18 percent for students who attended the same school from kindergarten to grade 3 compared with 14 percent for students who changed schools during this period, after other student demographic characteristics and education experiences were controlled for (figure 1). The difference between those probabilities was minor.

Implications

Most student characteristics and education experiences studied had positive, though minor, associations with grade 3 reading proficiency rates. It is therefore difficult to derive specific policy implications without further analysis. CNMI Public School System stakeholders might benefit from conducting additional research focused on understanding the differences in education experiences of their students.

The inability to consistently link teacher data to student data, a limited set of possible factors, and a lack of complete data on factors such as absenteeism made it impossible to examine the relationship between grade 3

Figure 1. Students who attended the same school from kindergarten to grade 3 had a higher probability of demonstrating reading proficiency in grade 3 than students who attended two or more schools

Predicted probability of demonstrating reading proficiency in grade 3 (percent)
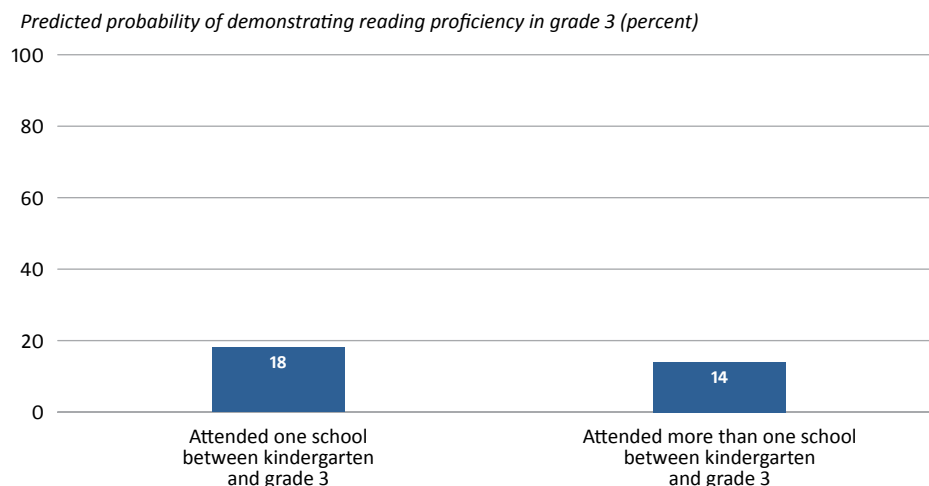
Note: n = 2,095. Results are predicted probabilities derived from hierarchical logistic regression analyses and using multiple imputation of missing data. Mobility was a statistically significant predictor (p <.05) of grade 3 reading proficiency (see table C2 in appendix C in the main report). Post-hoc comparisons indicated that students who attended one school between kindergarten and grade 3 had a statistically significantly higher predicted probability of demonstrating reading proficiency in grade 3 than students who attended two or more schools from kindergarten to grade 3 (p < .05).

Source: Authors' analysis based on 2011–19 administrative data files provided by the Commonwealth of the Northern Mariana Islands Public School System.

reading proficiency and other, potentially more influential, factors. The study team's research review suggests that teacher education, teacher years of experience, and positive school climate might also be linked to grade 3 reading proficiency. Because grade 3 reading performance varied widely across schools, exploring relationships between other education environment factors and student performance might help explain that variance and might provide CNMI Public School System stakeholders greater insight on school characteristics or experiences that are stronger drivers of student reading proficiency.

The largest difference in grade 3 reading performance that the study found was between Filipino students and their non-Filipino peers, while other differences, such as those between students who changed schools and students who did not change schools, were minor, though statistically significant. Supplemental analyses showed that Filipino students had a higher probability of having enrolled in Head Start than their peers. However, having enrolled in Head Start did not explain Filipino students' higher probability of demonstrating reading proficiency in grade 3. The explanation behind this finding warrants further study. Research suggests that, rather than focusing on uncontrollable categories such as ethnicity or free or reduced-price lunch, future studies could observe potential behaviors or processes over which schools might have more influence.[7] More detailed qualitative data (collected via surveys, interviews, or focus groups) might help elucidate the underlying behaviors or supports that Filipino students have that could explain their performance. This information could then be used to target other students with additional resources to raise their overall reading achievement.

The study did not find a statistically significant association between Head Start enrollment and grade 3 reading proficiency. One possible reason for this is that students who had not enrolled in Head Start caught up with their peers during the years from kindergarten to grade 3. Another possible reason is that Head Start attendance or active participation—rather than enrollment, the factor examined in this study—drives differences in academic outcomes. These possibilities, or other unobserved student demographic characteristics or education experiences, require further exploration.[8] The CNMI Public School System and other stakeholders could use the information presented in this study to track the reading performance (and other academic or nonacademic outcomes) of Head Start enrollees and their peers who did not enroll in center-based early childhood education at additional time points—including kindergarten entry, middle school, and high school—to better understand how Head Start is associated with student performance. If data are available, CNMI Public School System stakeholders could also compare these associations with those for students who did or did not enroll in other early childhood education programs for further insight into the academic outcomes of the larger early childhood education landscape.

7. Raag, T., Kusiak, K., Tumilty, M., Kelemen, A., Bernheimer, H., & Bond, J. (2011). Reconsidering SES and gender divides in literacy achievement: Are the gaps across social class and gender necessary? *Educational Psychology, 31*(6), 691–705. https://doi.org/10.1080/01443410.2011.599835.

8. Meloy, B., Gardner, M., & Darling-Hammond, L. (2019). *Untangling the evidence on preschool effectiveness: Insights for policymakers.* Learning Policy Institute. Retrieved September 7, 2020, from https://learningpolicyinstitute.org/product/untangling-evidence-preschool-effectiveness-report.