Analysis of One Cohort: 2015-2016 Kindergarten Assessment Approaches to Learning Scores and 2018-2019 Third Grade Reading Scores

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Early Learning Hub
of Linn, Benton & Lincoln Counties

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Analysis Background

Oregon administers the Kindergarten Assessment for all incoming kindergarten students in an effort to gauge student's skills before the school environment's impact (Oregon Department of Education: Kindergarten Assessment: Student Assessment: State of Oregon, n.d.). This provides families, schools, communities, and policy makers a snapshot of social, self-regulatory, and academic skills of incoming kindergarteners.

There are three categories of evaluation for students including Early Literacy, Early Math, and Approaches to Learning. While academic scores (Early Literacy and Early Math) can be predictive of third grade success, this analysis will focus on the association between Approaches to Learning and Third Grade Reading scores.

These measures are important because early self-regulation, social competency, and aspects of early achievement can predict achievement later in life.

Kindergarten Assessment-Approaches to Learning is based off of the Child Behavior Rating Scale, which is strongly predictive of reading and mathematics achievement and has been validated in many cultural contexts (Somerville, n.d.).

The Early Learning Hub of Linn, Benton, & Lincoln counties wanted to know how this relationship presents in their own region with a cohort of students. Data was collected and compiled for this analysis from students in all three counties who were in kindergarten from 2014-2015, and third grade from 2018-2019. Last year in 2019, an intern completed an analysis of this relationship with the previous year's cohort data.

What information do we evaluate about students?

School County
- Linn County
- Benton County
- Lincoln County

Gender
- Male
- Female

English Language Learner Status

Economic Disadvantage Status

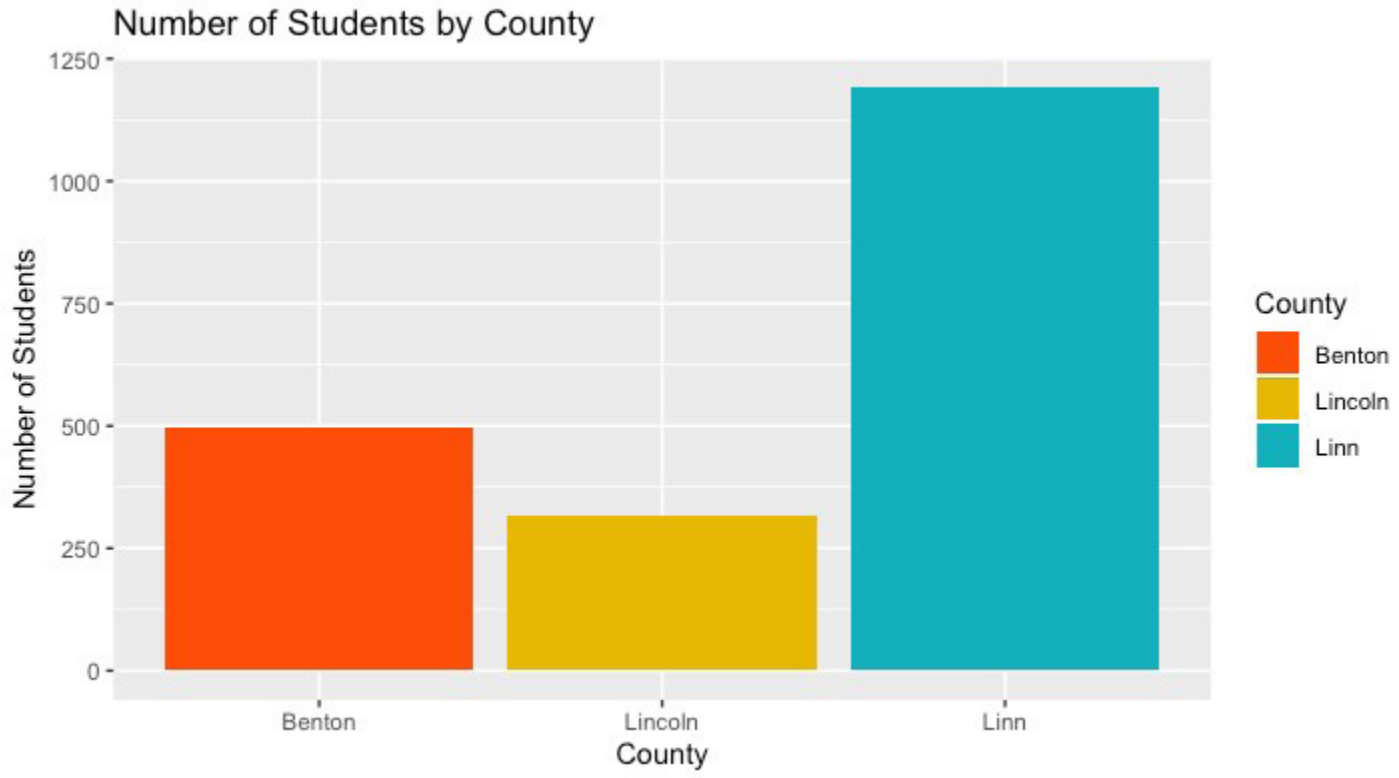
Race/Ethnicity
- American Indian/Alaska Native
- Hispanic
- Multiple Races
- Native Hawaiian/Pacific Islander
- Non-Hispanic Asian
- Non-Hispanic Black
- Non-Hispanic White

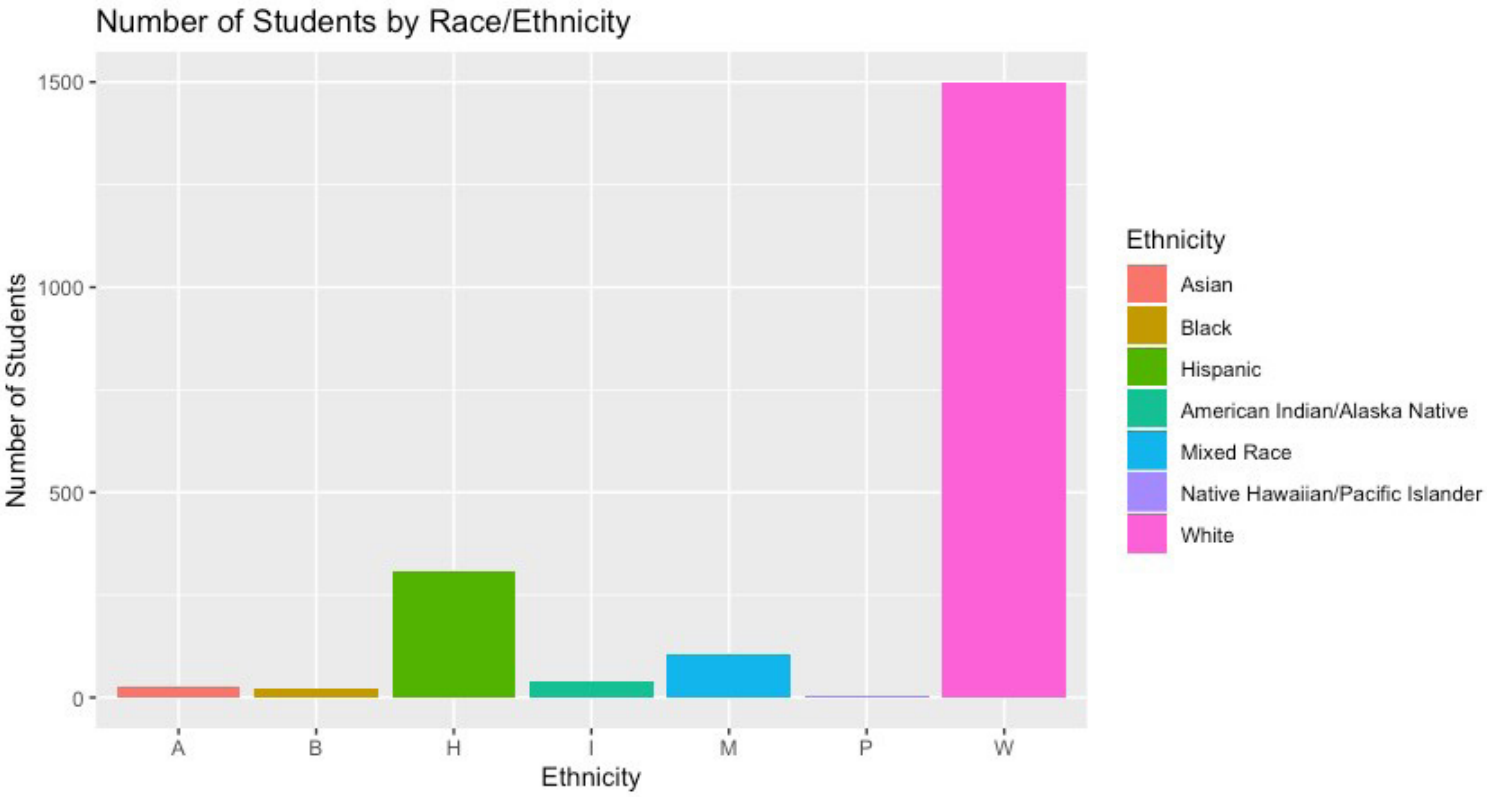
Special Education Status

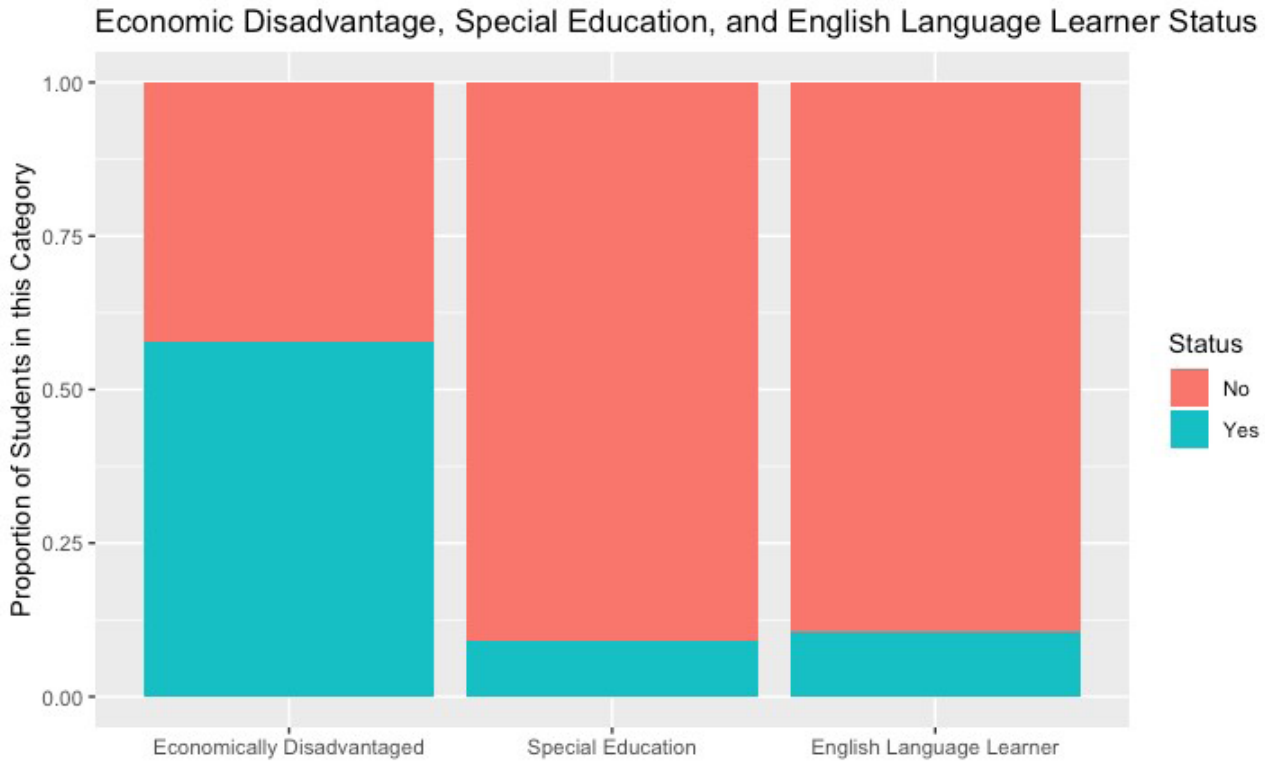
Characteristics of this Cohort

For this cohort, a total of 2,008 students were included in the analysis.

The following graphs show:
- Students per County
- Race/Ethnicity Distribution
- Proportion of Students who are Economically Disadvantaged, in Special Education Programs, and English Language Learner Status




Number of Students by Race/Ethnicity
Number of Students
1500
1000
500
0
A
B
H
I
M
P
W
Ethnicity
Ethnicity
Asian
Black
Hispanic
American Indian/Alaska Native
Mixed Race
Native Hawaiian/Pacific Islander
White


Economic Disadvantage, Special Education, and English Language Learner Status
Proportion of Students in this Category
1.00
0.75
0.50
0.25
0.00
Economically Disadvantaged
Special Education
English Language Learner
Status
No
Yes

How are students scored?

Kindergarten Assessment
Approaches to Learning Interpretation

Score	Knowledge Level	Description
1.00-2.90	**Developing**	Follow direction and complete tasks, interact with peers and adults appropriately, and express thoughts and feelings appropriately with intensive adult support
2.91-3.99	**Approaching**	Follow direction and complete tasks, interact with peers and adults appropriately, and express thoughts and feelings appropriately with some adult guidance/direction
4.00-5.00	**Demonstrating and Above**	Follow direction and complete tasks, interact with peers and adults appropriately, and express thoughts and feelings appropriately with minimal adult reminders/support

Third Grade English
Language Arts/Literacy Interpretation

Knowledge Level	Knowledge Category	Description
NA	**Level 1**	Requires students to receive or recite facts and use simple skills
2367-2431	**Level 2**	Requires procedural knowledge and skills; integrating and application of concepts
2432-2489	**Level 3**	Requires strategic thinking; non-routine problem solving
2490+	**Level 4**	Requires extended thinking; developing hypothesis and performing complex analyses

Scores of students for this cohort:

Kindergarten Assessment-Approaches to Learning (KA-AL)
Scores range from 1-5
Mean score is 3.64

Third Grade Reading (TGR)
Scores range from 148-2719
Mean score is 2393

What questions did we ask for this cohort?

- How do student scores differ by county?
- How do student scores differ by gender?
- How do student scores differ by race/ethnicity?
- How do student scores differ when a student is economically disadvantaged?
- How do student scores differ when a student is enrolled in special education?
- How do student scores differ when a student is an English language learner?
- What is the relationship between KA-AL scores and TGR scores?
- Does this relationship differ by demographic characteristics?

Methods

ANOVA: ANOVA is an acronym for analysis of variance, and is often used for analyzing data with multiple categories (levels) in a variable. In this analysis, ANOVA was used to determine the difference in KA-AL and TGR scores between the three counties.

Tukey Multiple Pairwise Comparisons: In an ANOVA when there is a significant difference, it can be between any of the levels in a variable. Tukey is used to determine in which counties there is a difference between levels.

Student's T-test: A student's t-test is used to evaluate differences in numerical dependent data between two groups. In this case, it is used for determining differences in score by gender, economic disadvantage, and English language learners. Note: Student refers her to the name of the test, not the students in the sample.

Wilcoxen-Rank Sum: This method is used similarly to the Student's t-test, but when the data is either skewed or the sample is small. It is used in this analysis for evaluating KA-AL and TGR scores by special education status.

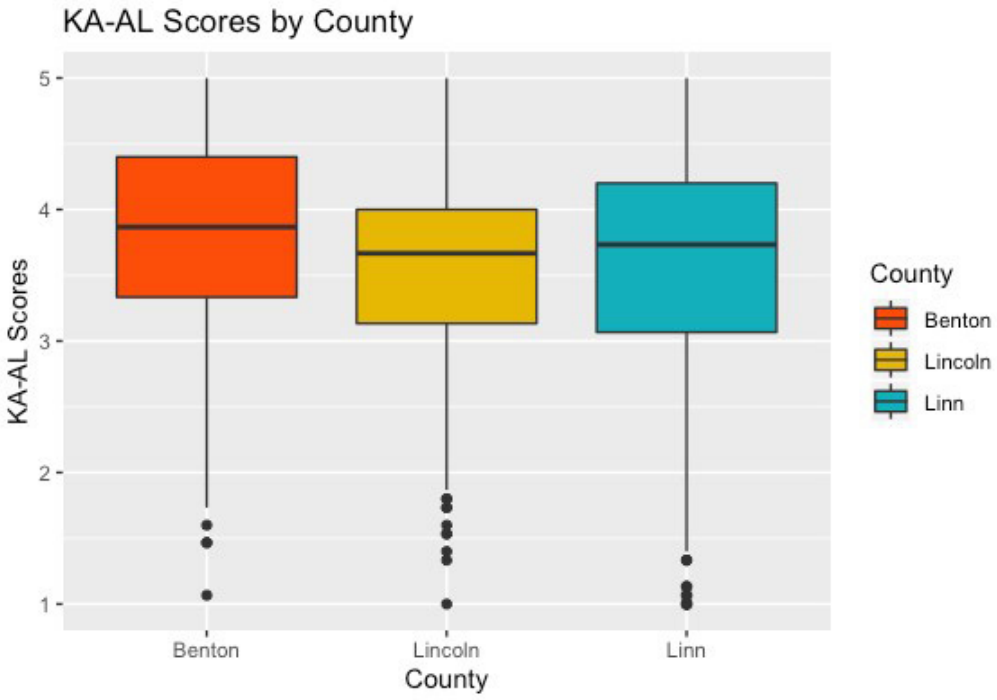
Kruskal-Wallis: Similarly, to an ANOVA, the Kruskal-Wallis test is used to determine differences in numerical dependent data between multiple levels in a variable, but when the data is either skewed or the sample is small. In this analysis, it was used to determine differences in KA-AL and TGR scores between race/ethnicity groups.

Dunn Test: In a Kruskal-Wallis test, the results only inform if there is a difference between any of the groups. Similar to Tukey multiple pairwise comparisons, the Dunn test is used to determine in which race/ethnicity groups there is a difference between levels.

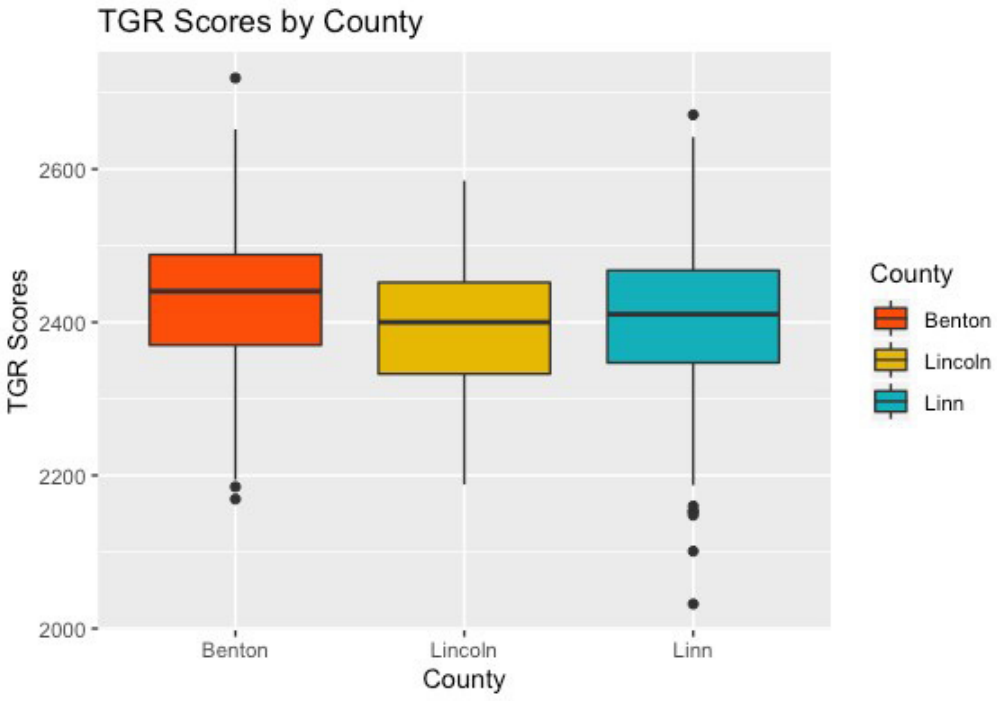
Linear Regression: Regressions are analyses that evaluate a positive or negatively associated relationship that linearly increases or decreases the dependent variable with every unit change in the independent variable. In this case, we are looking at the relationship between KA-AL scores and TGR scores.

How do scores differ by county?

ANVOA and Tukey multiple pairwise comparisons used to determine differences by county



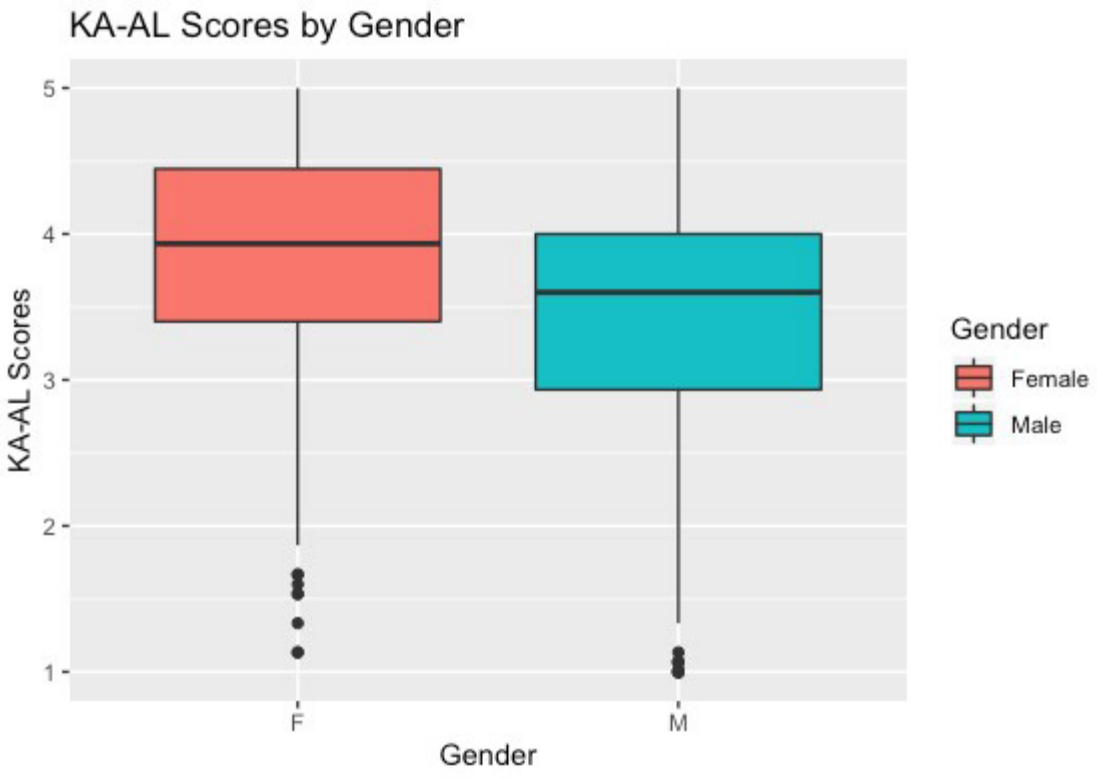
There is a difference between Lincoln and Benton county and Linn and Benton county for KA-AL scores



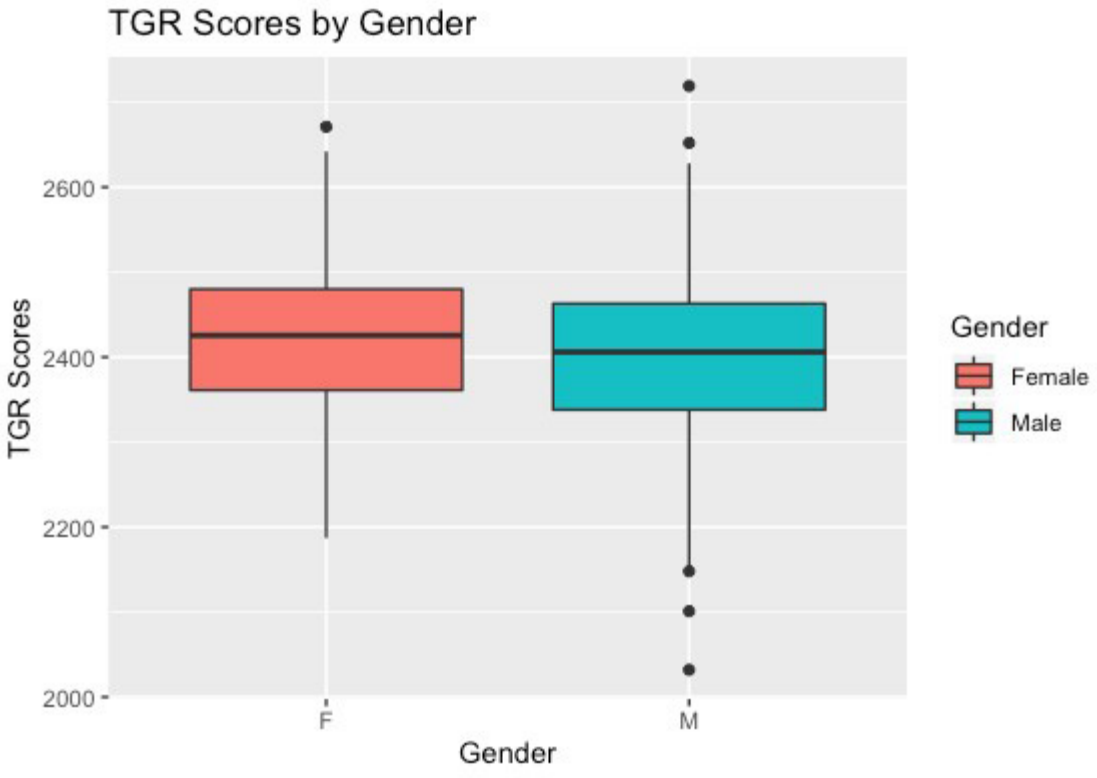
There is a difference between all three counties by TGR scores

How do scores differ by gender?

Student's T-test used to determine differences in KA-AL and TGR scores by gender



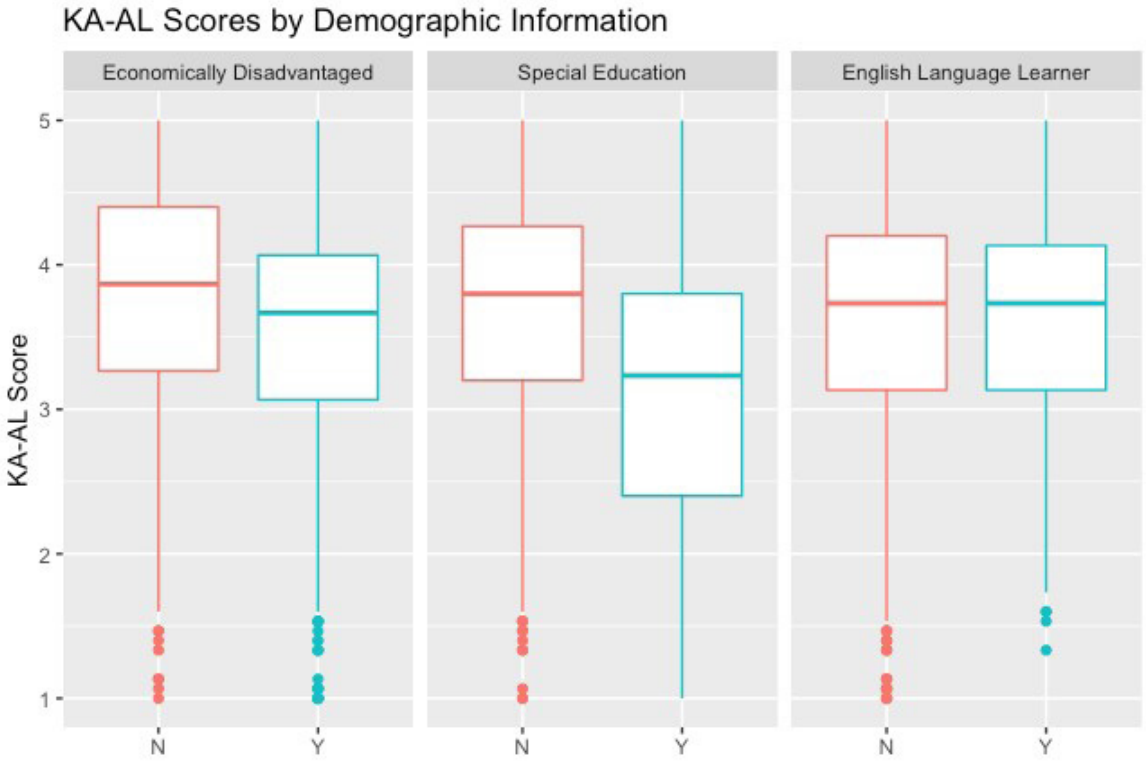
There is a difference in scores between genders by KA-AL and TGR scores



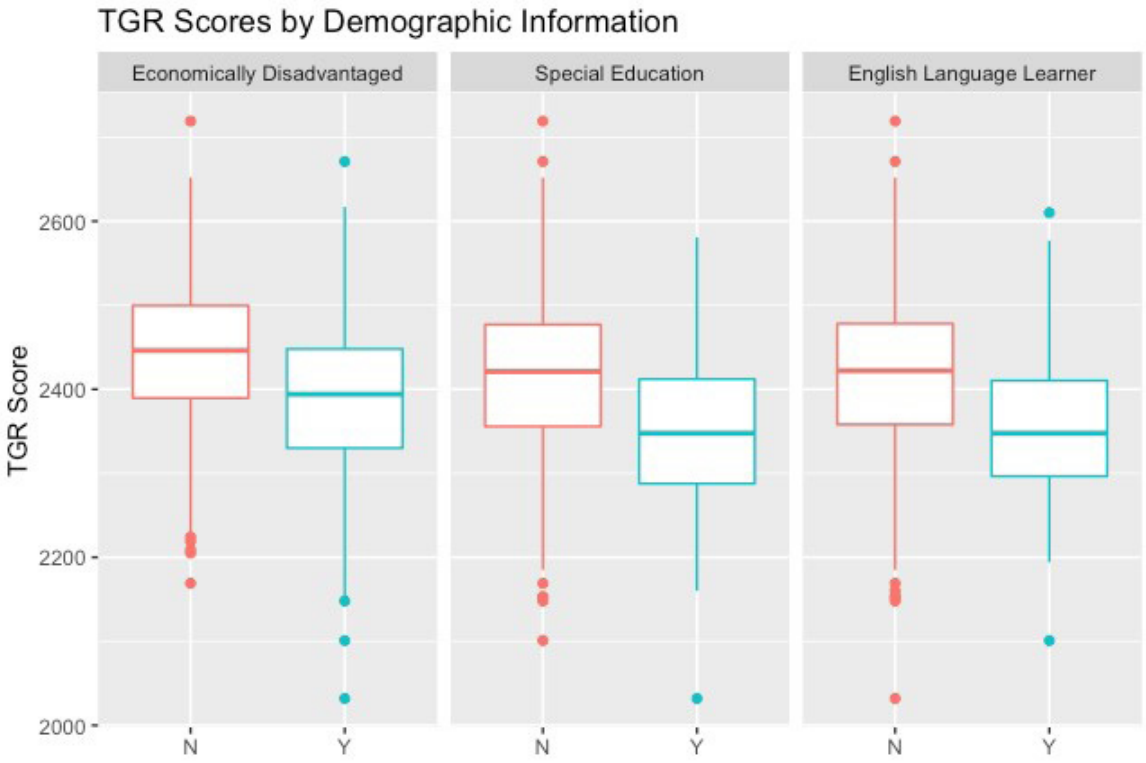
There is a greater magnitude of difference between genders in KA-AL scores than TGR scores

How do scores differ by other demographic characteristics?

Student's T-test used for Economically Disadvantaged and English Language Learners, Wilcoxen-Rank Sum test used for Special Education



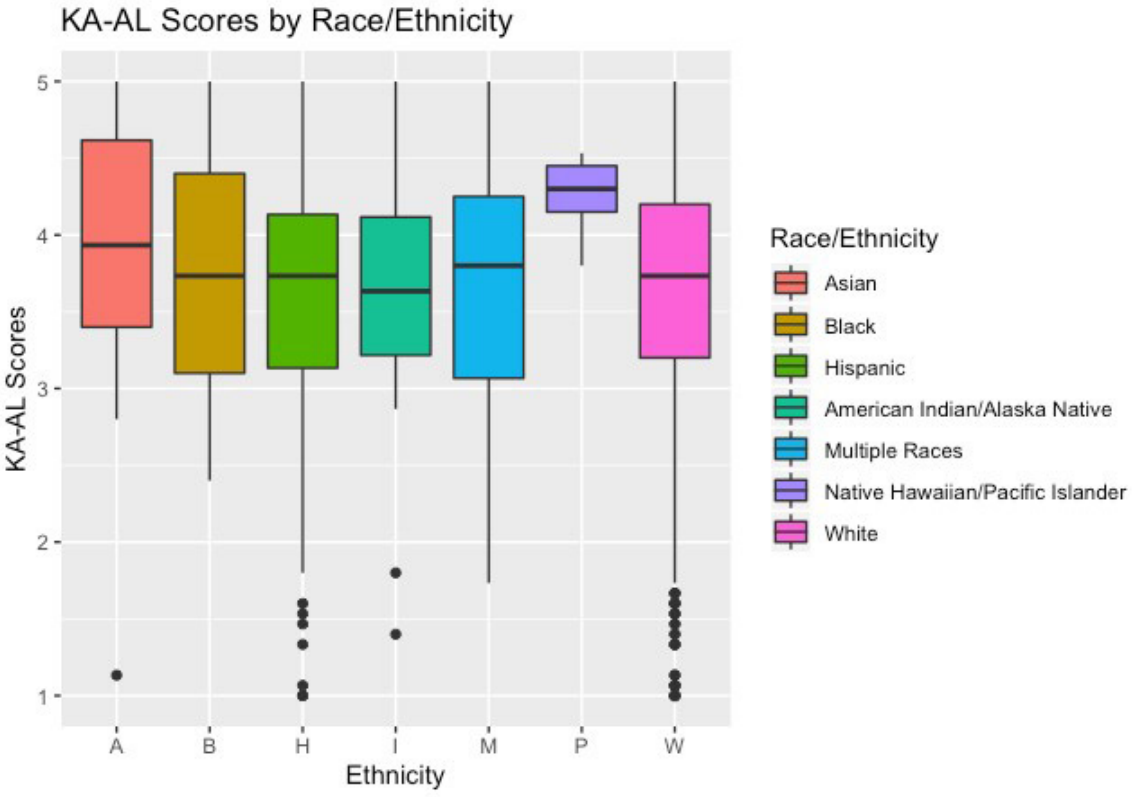
There is a difference between KA-AL and TGR scores between Economically Disadvantaged and Special Education groups



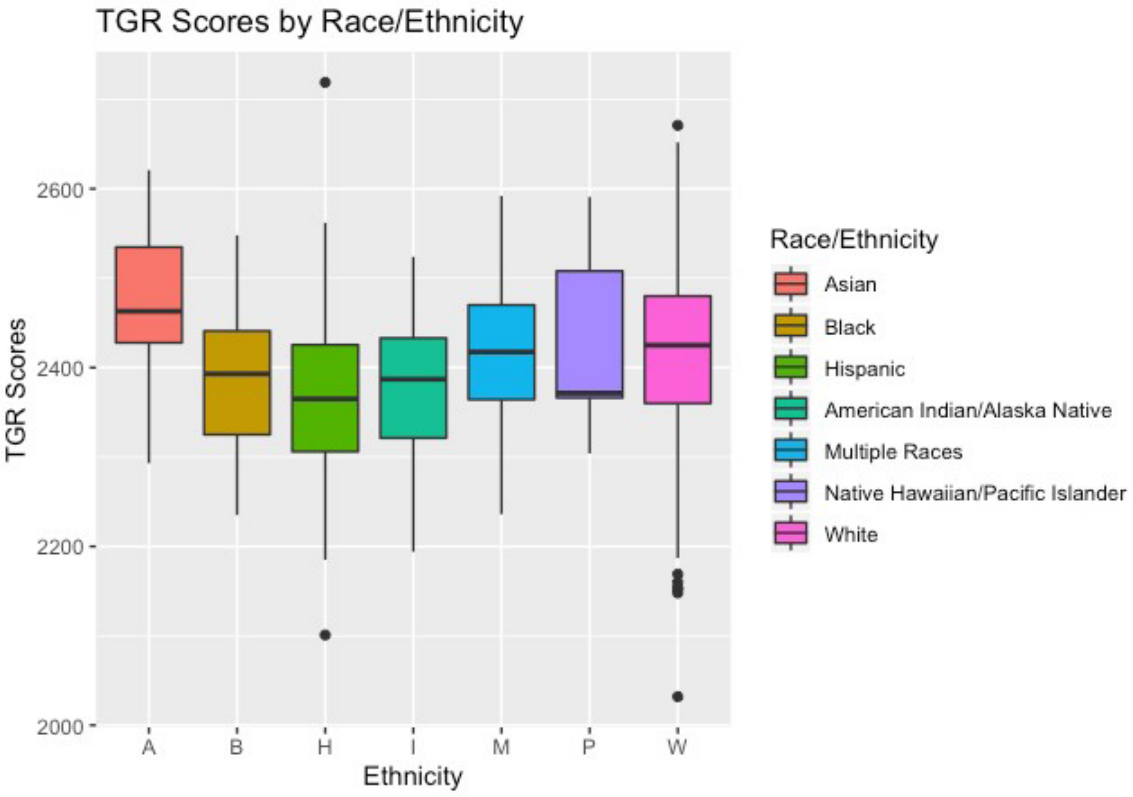
There is no difference in KA-AL score between English Language Learners

How do scores differ by race/ethnicity?

Kruskal-Wallis and Dunn tests used to determine differences by race/ethnicity

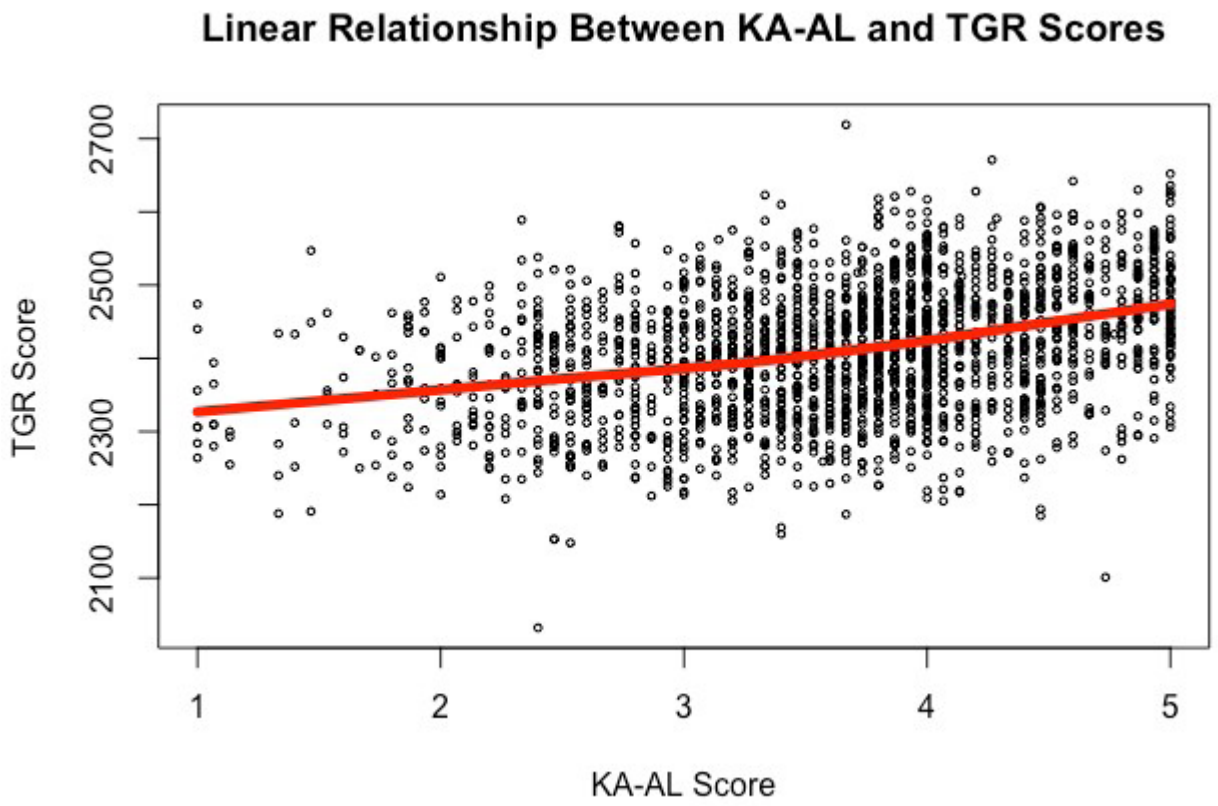


There is no difference in KA-AL scores between Race/Ethnicity groups



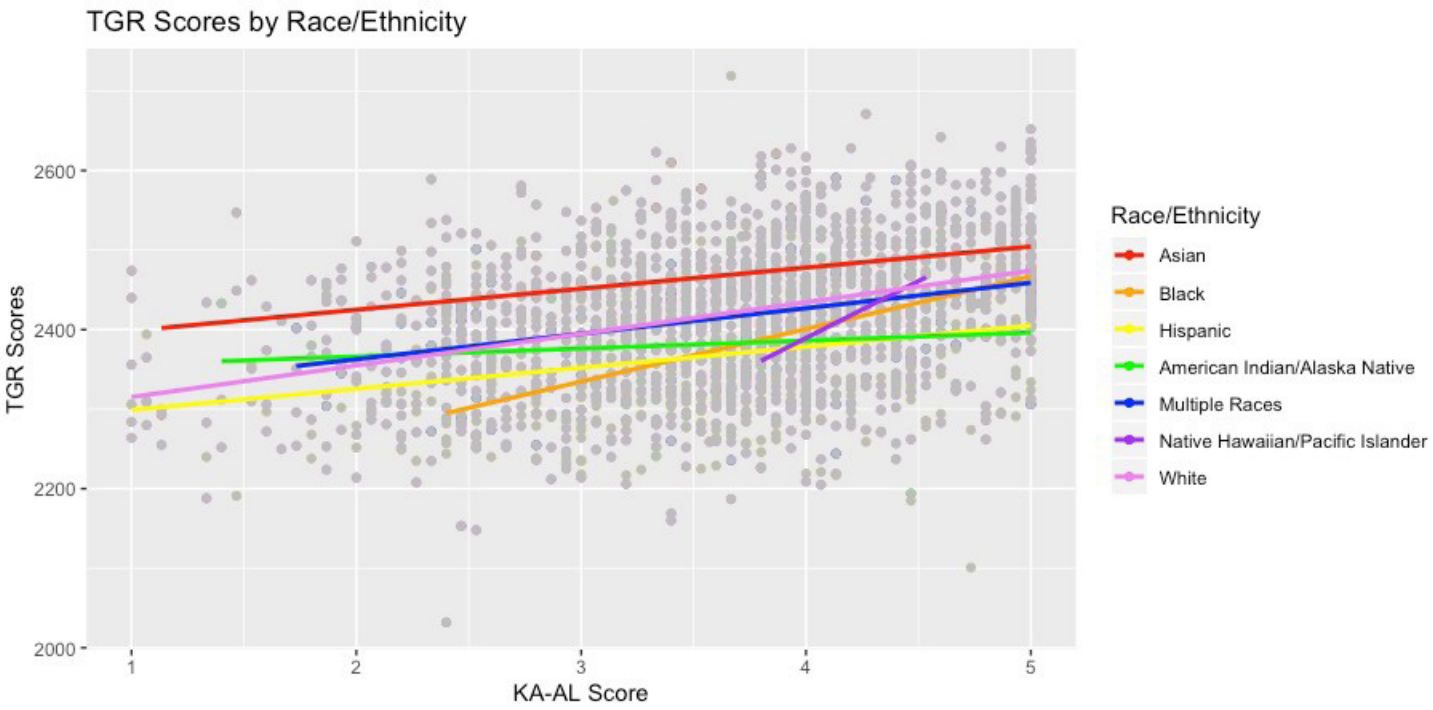
For TGR scores, there is only a difference between a few comparison groups

Linear Regression



- An association exists between KA-AL and TGR scores where each unit increase in KA-AL score is met with a linear increase in TGR score
- With further modeling, other variables that help predict TGR scores include Economic Disadvantage status, English Language Learner status, and Special Education status

Effect Modification



- Demographic groups can change the relationship between KA-AL and TGR scores
- When variables are effect modifiers, the relationship of the predicting variable (KA-AL) to the response variable (TGR) differs by groups in a variable
- English Language Learner status, Economic Disadvantage status, and Special Education status are also effect modifiers

Modelling's Impact on Predicted Score

Mean (TGR Score)=
β_0+ β_1 (KA-AL Score)+β_2 (Econ. Disad.)+ β_3 (Spec. Education)+
β_4 (Eng. Lang. Learn.)

Ex #	KA-AL Score	Economic Disadvantage?	Special Education?	English Language Learner?	Predicted TGR Score
1	3.6	No	No	No	2439.8
2	3.6	Yes	No	No	2404.7
3	3.6	No	Yes	No	2396.9
4	3.6	No	No	Yes	2389.4
5	3.6	Yes	Yes	No	2361.8
6	3.0	No	No	No	2420.9

We can predict what TGR score a kindergartener will have by including other information about the student to view the attributable difference. In the table above, the predicted TGR score changes based upon differences in KA-AL score, or if the student is economically disadvantaged, in special education, or an English language learner.

Conclusions

Scores among students can differ significantly on average based upon demographic differences.

- KA-AL scores for students in Benton County are significantly different than students in Linn and Lincoln County, TGR scores are different among all three counties.
- TGR scores are significantly different between genders, but there is a greater magnitude of difference in KA-AL scores.
- TGR scores are significantly different between students who are economically disadvantaged, in special education, or who are English language learners, compared to those who are not. This difference is true in KA-AL scores, except for between those who are English language learners and those who are not.
- Between different race/ethnicity groups, there is no difference in KA-AL scores, and only a difference between some groups in TGR scores.
- Race/ethnicity, English language learner status, economic disadvantage status, and special education status are all effect modifiers of KA-AL score on TGR score.

Limitations

This data set is limited by small sample sizes for many race/ethnicity groups, those who are English language learners, or who are in special education.

Citations

1. *Oregon Department of Education: Kindergarten Assessment: Student Assessment: State of Oregon*. (n.d.). Retrieved April 9, 2020, from https://www.oregon.gov/ode/educator-resources/assessment/Pages/Kindergarten-Assessment.aspx

2. Somerville, S. (n.d.). *Oregon Kindergarten Assessment Specifications 2016-2017*. 26.