

Predicting Academic Readiness from Social Emotional Assessment Data: Development of the Mosaic Readiness Index

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Introduction

This paper documents the development of the Mosaic Readiness Index, a score that is reported for individuals who take the high school version of Mosaic™ by ACT®: Social Emotional Learning Assessment (hereafter referred to as the Mosaic assessment). The paper describes the (a) rationale behind the index, (b) sample of data and statistical methods used for estimating the index's scoring parameters, and (c) results that show how well the index predicts academic readiness. We also document the development of the percentile ranks and score levels that are reported for the index and compare average scores for different groups of students.

Rationale

The Mosaic assessment is a comprehensive system designed to measure five social and emotional (SE) skills and two dimensions of school climate (ACT, 2021). The assessment is designed to provide a holistic picture of students' strengths and areas for growth with reports that provide feedback on each skill. For more information about the assessment, including the item types, number of items per item type, and response options, please see the Mosaic technical manual (ACT, 2021).

The SE skills measured by the assessment predict several important academic, occupational, social, and quality-of-life outcomes (ACT, 2021). Although the assessment provides feedback on five individual skills (Sustaining Effort, Getting Along with Others, Maintaining Composure, Keeping an Open Mind, and Social Connection) and two separate measures of school climate (Relationships with School Personnel and School Safety Climate), it previously did not assimilate information across these skills to predict important outcomes. Given prior research evidence connecting SE skills to other desirable outcomes, it is possible that information gleaned from different assessment items across multiple SE skills and school-climate indicators could predict academic outcomes.

Therefore, we sought to develop a summary index that uses item-level data from the assessment to optimize our prediction of academic readiness as measured by high school grades, high school coursework, and ACT Composite scores. Such an index could be used to provide additional information to students, parents/caregivers, teachers, and school counselors on students' overall academic outlook, given their responses to the SE skill assessment. This

information could be used to identify students who may need extra support to meet their academic goals and reach college and career readiness during high school.

Academic Readiness and Prediction Framework

There are different ways to conceive of and measure academic readiness. Because we sought an index for high school students, we focused on aspects of academic readiness that are relevant to individuals as they leave high school: high school grades, high school coursework, and ACT test scores. Colleges often rely on these measures to support decisions for admissions, scholarships, and course placement.

In an earlier study, researchers at ACT developed a measure of difficulty-adjusted high school GPA, which we refer to as the ACT Rigor Index. It is based on student-reported grades in up to 30 different high school courses and incorporates indicators for advanced coursework and students' plans for taking upper-level STEM courses (chemistry, physics, advanced math, and calculus). While the ACT Rigor Index is strongly dependent on the grades students earn, it also awards higher scores for students who take more difficult courses (e.g., calculus, chemistry, other math beyond algebra 2). Relative to high school GPA, the ACT Rigor Index has less skewness and higher correlations with college degree attainment (Allen & Mattern, 2019). We use the ACT Rigor Index, a summary measure of high school coursework and grades, as one measure of academic readiness.

The ACT test is designed to measure the knowledge and skills most important for success in college and careers (ACT, 2020). The ACT Composite score summarizes performance on the English, math, reading, and science sections of the test. While ACT Composite scores correlate strongly with high school GPA and the ACT Rigor Index, research has shown that ACT Composite scores help differentiate students' academic readiness and improve the accuracy of their predicted college outcomes (ACT, 2020). Although the meaning of high school grades varies across and within high schools and also over time, ACT scores are designed to be comparable across schools and different test administrations. We therefore use the ACT Composite score as a standardized measure of academic readiness.

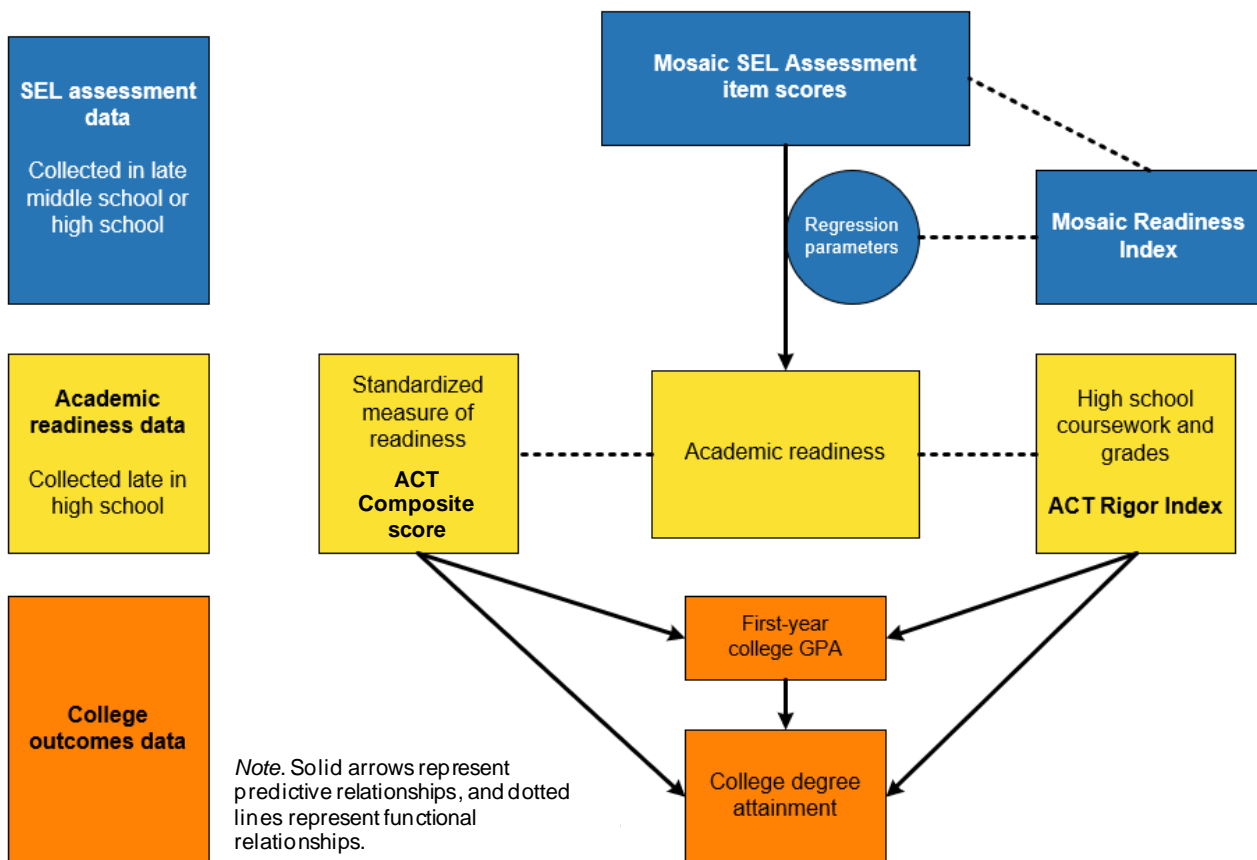
Prior research suggests that ACT Composite and high school GPA predict college outcomes. For example, in a sample of students who enrolled at four-year institutions, the correlations of ACT Composite score and high school GPA with first-year college GPA were 0.49 and 0.51, respectively. Similarly, the point biserial correlations of ACT Composite score and high school GPA with timely degree attainment (obtaining a bachelor's degree after four years) were 0.26 and 0.27, respectively. We found that, in addition to the ACT Composite score and high school GPA, a measure of student motivation and several demographic variables improved the accuracy of predicted first-year college GPA. In a multiple-predictor regression model, the standardized regression weights for ACT Composite score and high school GPA were very similar, 0.357 and 0.363, respectively. In turn, first-year college GPA was a strong predictor of timely degree attainment (Allen & Robbins, 2010).

In another study following a large sample of ACT-tested high school students, the ACT Rigor Index and ACT Composite score predicted bachelor’s degree (or higher) attainment within seven years of high school completion with point-biserial correlations of 0.48 and 0.46, respectively. In a multiple-predictor logistic regression model, the ACT Rigor Index and ACT Composite score had similarly sized standardized regression weights (Allen & Mattern, 2019).

To form a measure of academic readiness, we combined the ACT Rigor Index with the ACT Composite score with equal weights, consistent with what was learned from the prior research about the relative strength of each predictor. The Mosaic Readiness Index aims to predict this combined measure of academic readiness.

Figure 1 illustrates the predictive framework used to develop the Mosaic Readiness Index. First, academic readiness was regressed on Mosaic assessment item responses to find which items are predictive and their respective weights (regression coefficients). Then, the Mosaic Readiness Index was scored by applying the weights to the Mosaic assessment data to derive a predicted academic readiness score. Because academic readiness predicts college outcomes, the Mosaic Readiness Index can be thought of as directly predicting high school academic success and therefore indirectly predicting college success.

Figure 1. Prediction Framework for Development of the Mosaic Readiness Index



Method

Sample and Descriptive Statistics

We assembled a data set of 5,510 students who took the Mosaic assessment and the ACT test. To be included in the analysis, students must have been in 11th or 12th grade when they took the ACT test and must have reported their high school coursework and grades within the ACT registration system. The students took the SE skills assessment in 9th grade (41%), 10th grade (27%), 11th grade (20%), or 12th grade (12%) and took the ACT test in 11th grade (65%) or 12th grade (35%). For students who took the ACT test multiple times, we used their last available test. The students completed (or were on track to complete) high school in 2019 (4%), 2020 (14%), 2021 (20%), 2022 (49%), or 2023 (14%).

The sample included students who are African American (5%), Asian (3%), Hispanic (11%), Native American (3%), Native Hawaiian or other Pacific Islander (0.2%), White (71%), two or more races (4%), or who did not select their race/ethnicity (3%). The sample included students who are female (55%), male (44%), and another gender (0.4%). Data were collected from 113 high schools from 37 states. The states with the largest samples included Kansas ($n = 899$), Ohio ($n = 597$), Louisiana ($n = 494$), Wisconsin ($n = 423$), Utah ($n = 419$), Wyoming ($n = 222$), Mississippi ($n = 213$), Alabama ($n = 202$), and Texas ($n = 191$).

The sample's average ACT Composite score was 21.1 with a standard deviation (SD) of 5.6; the average high school GPA was 3.37 (SD 0.66). For the 2022 ACT-tested high school graduating class, the average ACT Composite score was 19.8 (SD 5.9; ACT, 2022). Among students in the 2022 ACT-tested cohort who reported their high school coursework and grades, the ACT Composite score was 21.3 (SD 5.9), and the average high school GPA was 3.42 (SD 0.60). Therefore, the sample has higher ACT scores relative to the national ACT-tested population but is very similar to the subset of the national ACT-tested population who reported their high school coursework and grades.

As described earlier, academic readiness was defined as the sum of ACT Composite score and ACT Rigor Index. Prior to being added, the ACT Composite score and ACT Rigor Index were standardized to have mean 0 and SD 1.

Table 1 provides correlations among the measures of academic readiness, correlations of the Mosaic assessment scores with the academic readiness measures, and summary statistics (means and standard deviations) for the measures of academic readiness.

By definition, academic readiness is highly correlated with ACT Composite score and ACT Rigor Index ($r = 0.92$). ACT Composite score is highly correlated with high school GPA ($r = 0.61$) and ACT Rigor Index ($r = 0.70$). Because high school GPA and the ACT Rigor Index are both based on high school grades, these variables are also highly correlated ($r = 0.93$). Among the Mosaic assessment scores, Sustaining Effort had the highest correlation with academic readiness ($r = 0.40$), followed by Getting Along with Others and Keeping an Open Mind ($r = 0.21$ for both).

Therefore, we would expect items from Sustaining Effort to be strongly represented among the items contributing to the Mosaic Readiness Index.

Table 1. Summary Statistics

| Variable | Pearson correlation | | | | |
|---------------------------|---------------------|-----------------|-----------------|--------------------|------------------------|
| | ACT Composite score | High school GPA | ACT Rigor Index | Academic readiness | Mosaic Readiness Index |
| ACT Composite score | — | 0.61 | 0.70 | 0.92 | 0.50 |
| High school GPA | 0.61 | — | 0.93 | 0.84 | 0.53 |
| ACT Rigor Index | 0.70 | 0.93 | — | 0.92 | 0.55 |
| Academic readiness | 0.92 | 0.84 | 0.92 | — | 0.57 |
| Mosaic Readiness Index | 0.50 | 0.53 | 0.55 | 0.57 | — |
| Sustaining Effort | 0.27 | 0.44 | 0.46 | 0.40 | 0.69 |
| Getting Along with Others | 0.15 | 0.24 | 0.25 | 0.21 | 0.56 |
| Maintaining Composure | 0.13 | 0.17 | 0.18 | 0.17 | 0.50 |
| Keeping an Open Mind | 0.18 | 0.19 | 0.21 | 0.21 | 0.49 |
| Social Connection | 0.10 | 0.13 | 0.15 | 0.13 | 0.37 |
| Relationships with School | | | | | |
| Personnel | 0.03 | 0.10 | 0.10 | 0.07 | 0.28 |
| School Safety Climate | 0.14 | 0.14 | 0.14 | 0.15 | 0.44 |
| Mean | 21.12 | 3.37 | −0.38 | 0.00 | 0.00 |
| SD | 5.63 | 0.66 | 1.19 | 1.84 | 1.26 |

Statistical Model

Multiple linear regression was used to model academic readiness as a function of the Mosaic assessment item scores. The model included 101 item scores as possible predictors, including 29 forced-choice items, 46 Likert-type items (including the School Safety Climate items), and 26 situational-judgment items. The Likert items have a 6-point ordinal rating scale, and the situational-judgment items have a 5-point ordinal rating scale. For the regression model, the Likert and situational-judgment item responses were assumed to have linear effects, so there was one parameter needed for each item. The forced-choice items have three response options (“least like me,” not selected, or “most like me”). The responses to the forced-choice items were treated as nominal, so there were two parameters needed for each item.

To accommodate the large set of predictors, we fit the model with an automated method, using the GLMSELECT procedure in SAS (SAS, 2017) with stepwise selection of predictor variables. Predictors were retained if they had a p -value less than 0.05. After fitting the model, we removed items if the direction of their regression coefficient was inconsistent with theory. For example, for a hypothetical Likert item with prompt “I come to class well-prepared,” we would expect the regression coefficient to be greater than 0, indicating a positive relationship with

academic readiness. If the regression coefficient were negative, indicating a negative relationship with academic readiness, we would remove the predictor from the model.

With a large set of predictors (101 possible predictors) relative to the sample size ($N = 5,510$), we were concerned about overfitting the model. This could lead to inflated estimates of how well the model predicts readiness (e.g., inflated R^2) and can also lead to lower generalizability of results to other samples of students. To help prevent inflated R^2 estimates, we used a cross-validation approach. We randomly split the sample into two groups of high schools: a development sample and a validation sample. We used the development sample to fit the regression model and then applied the model to the validation group. Using the validation group, we obtained the correlation of the model's predicted values of readiness with the observed values of readiness. We repeated the cross-validation steps 10 times, with the high schools assigned at random to the development or validation sample at each iteration, and then we found the average of the cross-validated correlations across the 10 iterations.

For each iteration of the cross-validation, the items retained as predictors and the estimated regression coefficients could change. The cross-validation approach was used only to estimate R , the correlation of the model's predicted and actual values of academic readiness. To derive the final model that we used to score the readiness index in practice, we used the entire sample.

Results

Regression Model Predicting Academic Readiness

Across the 10 iterations of the cross-validation, the average correlation of the Mosaic Readiness Index (predicted value of academic readiness) with the actual value of academic readiness was 0.54. For the final model that used the entire sample (without the cross-validation steps), the correlation was 0.57 (Table 1). The cross-validated R (0.54) is a more realistic estimate of how well the Mosaic Readiness Index will predict academic readiness in a new sample of students.

To understand how well the Mosaic Readiness Index predicts academic readiness, it is also helpful to examine classification accuracy. We considered four levels of academic readiness: very low (academic readiness percentile ranks of 1 to 16), low (percentile ranks of 17 to 49), high (percentile ranks of 50 to 84), and very high (percentile ranks of 85 and higher). Four levels of the Mosaic Readiness Index were similarly defined. We then examined the cross-classification of the two variables (Table 2). This categorization scheme is applicable to a system for identifying students for extra support if they score 1 SD below the mean on the Mosaic Readiness Index.

Of the 906 students who had very low Mosaic Readiness Index scores, 416 (46%) had very low academic readiness, and another 347 (38%) had low academic readiness. Only 16 students (< 2%) had very high academic readiness. Conversely, of the 858 students who had very high Mosaic Readiness Index scores, 8 (< 1%) had very low academic readiness, and 122 (14%) had low academic readiness.

Table 2. Mosaic Readiness Index Classification Accuracy

| Mosaic Readiness Index score level | Academic readiness level | | | | Total |
|------------------------------------|--------------------------|--------------|--------------|------------|--------------|
| | Very low | Low | High | Very high | |
| Very Low (PR \leq 16) | 416 | 347 | 127 | 16 | 906 |
| Low (PR 17–49) | 367 | 786 | 541 | 112 | 1,806 |
| High (PR 50–84) | 118 | 563 | 888 | 371 | 1,940 |
| Very High (PR \geq 85) | 8 | 122 | 372 | 356 | 858 |
| Total | 909 | 1,818 | 1,928 | 855 | 5,510 |

Note. PR = percentile rank.

Of the 101 possible item predictors, 48 were significant predictors of academic readiness in the final model, including 10 forced-choice items, 14 situational-judgment items, and 24 Likert items. However, 2 forced-choice items, 1 situational-judgment item, and 6 Likert items were removed from the model because their regression coefficients were not consistent with theory. Therefore, the Mosaic Readiness Index is based on 39 items (8 forced-choice, 13 situational-judgment, and 18 Likert items). In this paper we do not identify the items or their weights (regression coefficients) because it is proprietary information. Eight of the items came from Sustaining Effort, seven came from Relationships with School Personnel, six came from Getting Along with Others, five came from Social Connection, five came from Keeping an Open Mind, four came from Maintaining Composure, and four came from School Safety Climate. Thus, all constructs measured on the Mosaic assessment are represented in the Mosaic Readiness Index.

The Mosaic assessment's scale scores also correlated positively with academic readiness: 0.40 for Sustaining Effort, 0.21 for both Getting Along with Others and Keeping an Open Mind, 0.17 for Maintaining Composure, 0.15 for School Safety Climate, 0.13 for Social Connection, and 0.07 for Relationships with School Personnel (Table 1). The Mosaic Readiness Index predicts academic readiness better than the individual scales because it optimizes the prediction using item-level scores from different scales.

The Mosaic Readiness Index also correlates with the scale scores: 0.69 for Sustaining Effort, 0.56 for Getting Along with Others, 0.50 for Maintaining Composure, 0.49 for Keeping an Open Mind, 0.44 for School Safety Climate, 0.37 for Social Connection, and 0.28 for Relationships with School Personnel (Table 1). These positive correlations are expected because the Mosaic Readiness Index is based on a subset of the items used for the scale scores.

Interpretations of Mosaic Readiness Index Scores

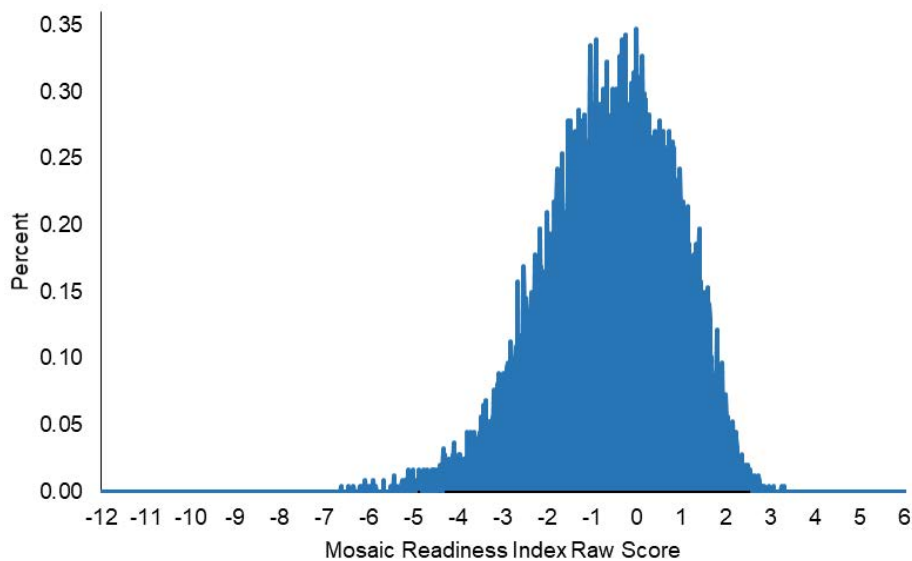
Derived from the multiple regression model of academic readiness, the Mosaic Readiness Index raw scores have mean 0 and *SD* 1.26 among the sample of students whose data were used to develop the index. Among all who had taken the Mosaic assessment ($n = 24,765$, which includes the students in the study sample and other students who had not taken the ACT test),

the mean was -0.58 with SD 1.41. We used the data from this larger sample of students to estimate percentile ranks for the Mosaic Readiness Index.

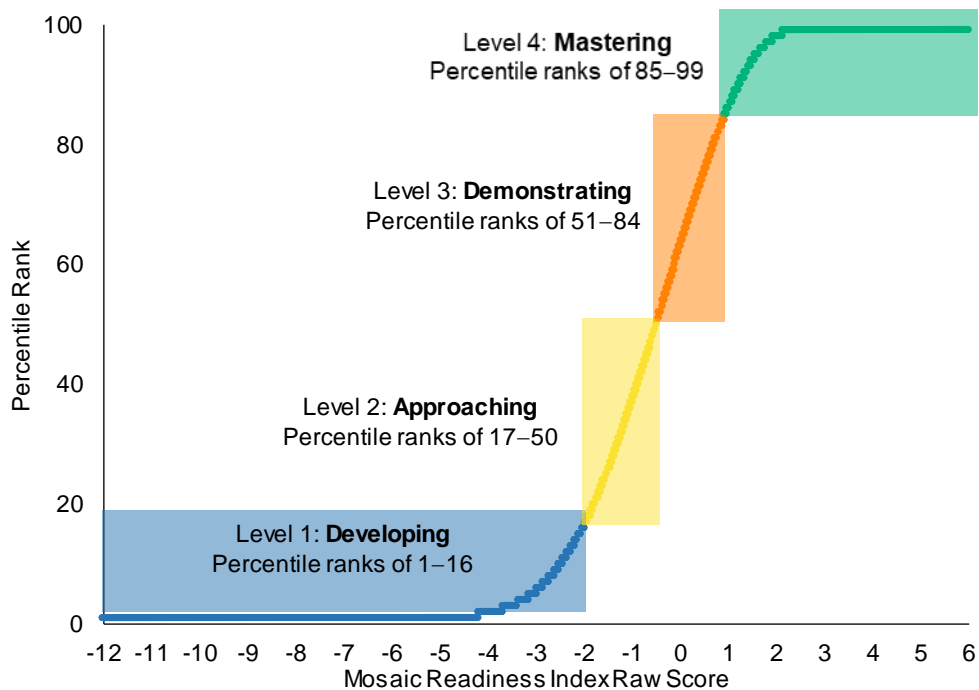
Students in the norming sample took the Mosaic assessment in 9th grade (60%), 10th grade (18%), 11th grade (11%), or 12th grade (10%). Students completed (or were on track to complete) high school in 2019 (4%), 2020 (8%), 2021 (14%), 2022 (32%), 2023 (35%), or 2024 (6%). The norming sample included students who are African American (6%), Asian (1%), Hispanic (18%), Native American (3%), Native Hawaiian or other Pacific Islander (0.3%), White (32%), two or more races (6%), or who did not select their race/ethnicity (34%). The norming sample included students who are female (51%), male (48%), another gender (0.4%), or who did not provide their gender (1%).

The frequency distribution of Mosaic Readiness Index raw scores is presented in Figure 2. Note that scores are rounded to the nearest hundredth. The lowest possible score is -12.14 , and the highest possible score is 6.05 . The minimum score observed in the norming sample was -6.63 , and the maximum score was 3.29 .

Figure 2. Mosaic Readiness Index Raw Score Frequency Distribution



We assigned percentile ranks to the scores according to the frequency distribution of raw scores. Figure 3 shows how the raw scores map to different percentile ranks.

Figure 3. Mosaic Readiness Index Percentile Ranks and Score Levels

Because the raw Mosaic Readiness Index scores do not have inherent meaning, percentile ranks are used for score reporting. Scores are also grouped into one of four levels based on the percentile rank, with the outermost two levels defined as being approximately 1 *SD* above (or below) the mean in the norming sample. For each level, we assigned a name and description as follows:

1. **Developing** (1st to 16th percentile): students most in need of additional supports to improve chances of academic success in postsecondary settings
2. **Approaching** (17th to 50th percentile): students in need of additional supports to improve chances of academic success in postsecondary settings
3. **Demonstrating** (51st to 84th percentile): students on track for academic success in postsecondary settings but who could benefit from some additional supports
4. **Mastering** (85th to 99th percentile): students with an excellent chance of academic success in postsecondary settings, with or without additional supports

The four score levels can also be interpreted in terms of predictions of academic outcomes associated with scores at each level (Table 3). For each score level, we provide the average predicted high school GPA (based on student-reported grades collected at ACT registration) and ACT Composite score. For each score level, the average prediction is obtained by

averaging the predictions for individual students at that score level. The predictions use the same data set that was used to develop the Mosaic Readiness Index because that data set includes students' high school GPA, ACT Composite score, and Mosaic Readiness Index.

Table 3. Mosaic Readiness Index Score Levels

| Level | Predictive interpretation Examinees at this level have an . . . |
|--|---|
| <p>1. Developing 1st to 16th percentile Students most in need of additional supports to improve chances of academic success in postsecondary settings.</p> | <p>Average high school GPA of 2.6, average ACT Composite score of 15, and academic readiness associated with a 33% chance of a postsecondary degree or certificate and 15% chance of first-year GPA of 3.0 or higher*</p> |
| <p>2. Approaching 17th to 50th percentile Students in need of additional supports to improve chances of academic success in postsecondary settings.</p> | <p>Average high school GPA of 3.1, average ACT Composite score of 19, and academic readiness associated with a 51% chance of a postsecondary degree or certificate and 34% chance of first-year GPA of 3.0 or higher*</p> |
| <p>3. Demonstrating 51st to 84th percentile Students on track for academic success in postsecondary settings but who could benefit from some additional supports.</p> | <p>Average high school GPA of 3.4, average ACT Composite score of 22, and academic readiness associated with a 65% chance of a postsecondary degree or certificate and 50% chance of first-year GPA of 3.0 or higher*</p> |
| <p>4. Mastering 85th to 99th percentile Students with an excellent chance of academic success in postsecondary settings, with or without additional supports.</p> | <p>Average high school GPA of 3.8, average ACT Composite score of 24, and academic readiness associated with a 78% chance of a postsecondary degree or certificate and 65% chance of first-year GPA of 3.0 or higher*</p> |

*College outcome predictions are based on students who enrolled in college.

We also provide the average chance of obtaining a postsecondary degree or certificate and the average chance of obtaining a first-year college GPA of 3.0 or higher. The predictions are based on analyses that established the relationship between the summary measure of academic readiness and the college outcomes among students who enrolled in college (more details on the data and analyses are in the appendix). The chances represent indirect predictions because the Mosaic Readiness Index is used to predict academic readiness, which is then used to predict college outcomes.

Group Differences in Mosaic Readiness Index Scores

Using the norming sample, we compared Mosaic Readiness Index raw scores by gender, grade level at the time of the Mosaic assessment, and race/ethnicity (Table 4). For each group, we present the sample size, mean, and *SD*. We tested for differences in mean scores using analysis of variance (ANOVA) and present the *d* effect size, representing the difference in mean scores (in *SD* units) relative to a reference group. Our reference groups for the gender, grade level, and race/ethnicity comparisons are, respectively, male, grade 12, and White. Students were not included in a comparison if their group data were missing.

Table 4. Examining Group Differences in Mosaic Readiness Index Raw Scores

| Student group | Summary statistics | | | | <i>d</i> | |
|-------------------|--------------------|----------|-----------|-------|-----------|-----------------|
| | <i>N</i> | <i>M</i> | <i>SD</i> | EST | <i>SE</i> | <i>p</i> -value |
| Gender | | | | | | |
| Another gender | 110 | -1.51 | 1.55 | -0.50 | 0.09 | < .001 |
| Female | 12,643 | -0.40 | 1.38 | 0.29 | 0.01 | < .001 |
| Male (reference) | 11,795 | -0.80 | 1.42 | — | — | — |
| Grade level | | | | | | |
| 9 | 14,870 | -0.76 | 1.40 | -0.27 | 0.02 | < .001 |
| 10 | 4,399 | -0.38 | 1.42 | 0.00 | 0.03 | 0.950 |
| 11 | 2,746 | -0.35 | 1.37 | 0.02 | 0.03 | 0.443 |
| 12 (reference) | 2,372 | -0.38 | 1.38 | — | — | — |
| Race/ethnicity | | | | | | |
| African American | 1,366 | -0.82 | 1.35 | -0.34 | 0.03 | < .001 |
| Asian | 352 | -0.09 | 1.35 | 0.17 | 0.05 | 0.001 |
| Hispanic | 4,524 | -1.14 | 1.34 | -0.56 | 0.02 | < .001 |
| Native American | 759 | -1.19 | 1.37 | -0.60 | 0.04 | < .001 |
| Two or more races | 1,352 | -0.81 | 1.45 | -0.33 | 0.03 | < .001 |
| White (reference) | 7,802 | -0.34 | 1.39 | — | — | — |

Note. *d* = effect size; *N* = group sample size; *M* = mean; *SD* = standard deviation; EST = estimate; *SE* = standard error.

Compared to students who are male, students who are another gender scored lower on the Mosaic Readiness Index ($d = -0.50$), whereas students who are female scored higher ($d = 0.29$). Compared to students who were in 12th grade when they took the SE skills assessment, students who were in 9th grade scored lower ($d = -0.27$). Students who were in 10th or 11th grade scored about the same as students who were in 12th grade, on average. Compared to students who are White, students who are Native American ($d = -0.60$), Hispanic ($d = -0.56$), African American ($d = -0.34$), or two or more races ($d = -0.33$) scored lower on the Mosaic Readiness Index, on average. Students who are Asian scored higher than students who are White ($d = 0.17$).

Conclusion

The Mosaic Readiness Index is designed to predict high school academic outcomes—namely high school coursework, high school grades, and ACT test scores. Compared to the Mosaic assessment scores for individual constructs, the Mosaic Readiness Index more strongly predicts academic readiness because this index optimizes its prediction using item-level data.

While the index is designed to indirectly predict college and career outcomes, it might also have direct relationships. A recent analysis found that the index helped predict college enrollment, even after controlling for high school GPA, ACT Composite score, and family income (Walton et al., 2022), suggesting that the SE skills represented in the Mosaic Readiness Index have a direct relationship with college enrollment. Future studies can examine whether the Mosaic Readiness index has direct relationships with other college and career outcomes.

As more academic readiness data are collected, we will update the model used to score the Mosaic Readiness Index. As more data about college and career outcomes materialize that can be linked to the Mosaic assessment data, it may be possible to develop additional indices with direct relationships to postsecondary outcomes. Further research is needed to better understand the nature of the differences in average scores across gender and racial/ethnic groups.

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Appendix: Predictions of College Outcomes

Analyses were conducted to estimate the predictive relationship between academic readiness and two college outcomes: first-year college GPA and college degree attainment. In this appendix, we describe the data and methodology used to develop the predictions.

First-Year College GPA

The analysis of first-year college GPA was based on 400,543 students who took the ACT test in high school and then enrolled at an institution that shared first-year college GPA data through ACT's research services or through a research partnership. The sample included 348,300 students enrolled at 118 four-year institutions and 52,243 students enrolled at 63 two-year institutions.

Students in the sample completed high school in 2013 (27%), 2014 (23%), 2015 (23%), 2016 (17%), or 2017 (10%). The sample was 56% female, 44% male, 10% African American, 3% Asian, 5% Hispanic, 0.6% Native American or Native Hawaiian/other Pacific Islander, 4% two or more races, and 74% White. Race/ethnicity data were not available for 3% of the sample. The mean (*SD*) of ACT Composite score and high school GPA was 23.4 (4.6) and 3.47 (0.49), respectively. The mean first-year college GPA was 2.88, and 58% of the sample earned a first-year college GPA of 3.0 or higher.

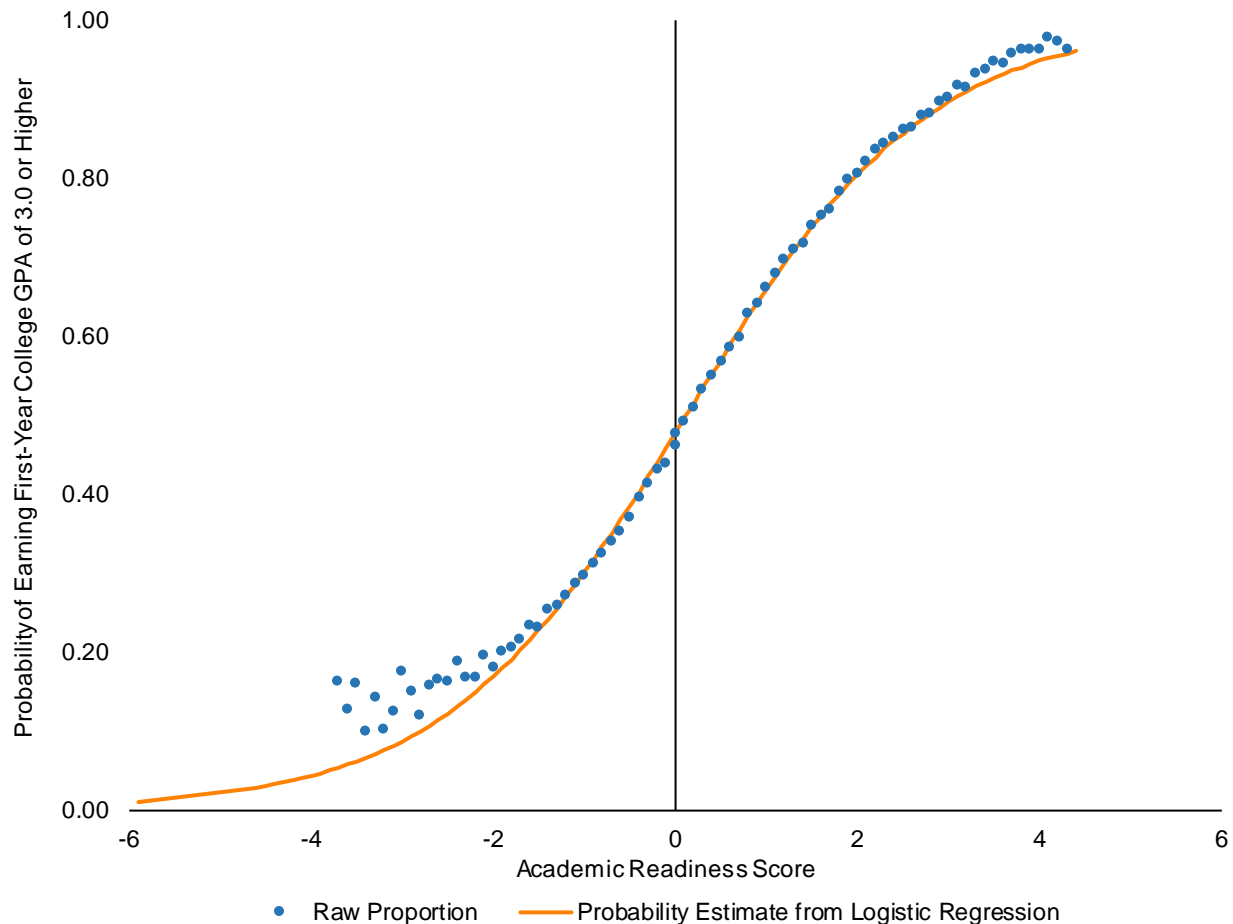
As described earlier in the paper, academic readiness was defined as the sum of the ACT Rigor Index and ACT Composite score after standardization, specifically:

$$\text{Academic Readiness} = \frac{(\text{ACT Rigor Index} + 0.3447029)}{1.1853235} + \frac{(\text{ACT Composite score} - 21.1901961)}{5.6360756}$$

The mean (*SD*) of academic readiness was 0.64 (1.47). The correlation of academic readiness and first-year GPA was 0.50, and the point-biserial correlation of academic readiness and earning a GPA of 3.0 or higher was 0.45.

We used logistic regression to model the probability of earning a first-year college GPA of 3.0 or higher as a function of academic readiness. The model's estimated intercept was -0.0882 (standard error of 0.00382), and the estimated slope was 0.7511 (standard error of 0.0029). The estimated intercept and slope are used to predict the log odds of success (first-year GPA of 3.0 or higher) as a function of academic readiness, which can then be transformed to a probability. Figure A1 shows the probability estimates as well as the raw proportions. The raw proportions are obtained after grouping students by their academic readiness score rounded to the nearest tenth. Results for groups with 50 or more students are shown in Figure A1.

Figure A1. Probability of First-Year College GPA of 3.0 or Higher, by Academic Readiness Score



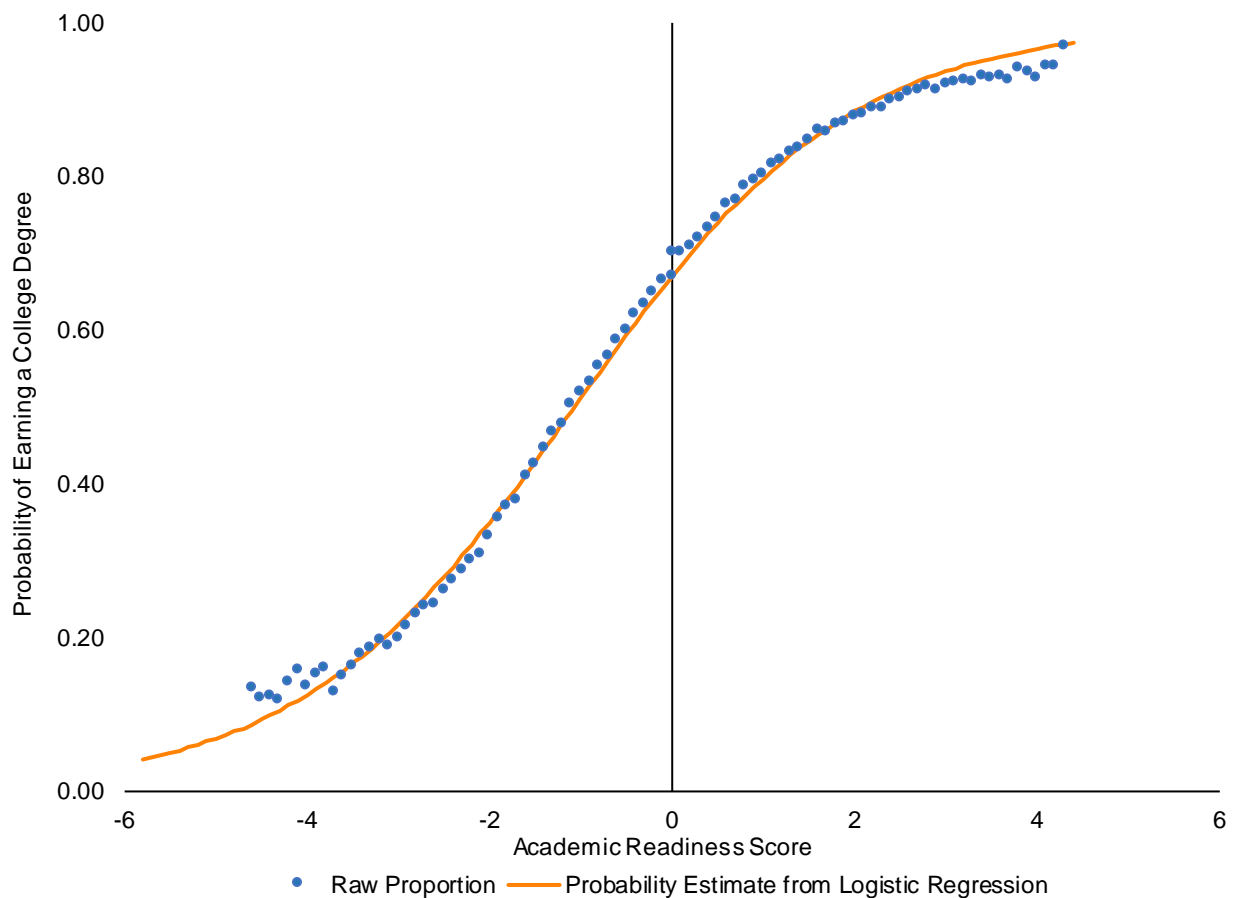
College Degree Attainment

The analysis of college degree attainment was based on 1,113,962 students who took the ACT test while in high school, completed high school in 2010, and enrolled in college in fall 2010. College degree attainment was tracked through the summer of 2017 by the National Student Clearinghouse. We classified students as having earned a degree if they had earned any postsecondary certificate or degree during that time.

The sample was 57% female, 43% male, 13% African American, 4% Asian, 9% Hispanic, 0.9% Native American, 3% two or more races, and 64% White. Race/ethnicity data were not available for 5% of the sample. The mean (*SD*) of ACT Composite score and high school GPA was 21.7 (5.0) and 3.27 (0.59), respectively. The mean (*SD*) of academic readiness was -0.01 (1.65), and 63% of the sample earned a college degree. The highest degree earned included bachelor's (47%), associate's (8%), master's or higher (6%), and certificate (2%). The point-biserial correlation of academic readiness and degree attainment was 0.45.

We used logistic regression to model the probability of earning a college degree as a function of academic readiness. The model's estimated intercept was 0.7092 (standard error of 0.00229), and the estimated slope was 0.6633 (standard error of 0.00159). The estimated intercept and slope are used to predict the log odds of obtaining a college degree as a function of academic readiness, which can then be transformed to a probability. Figure A2 shows the probability estimates, as well as the raw proportions. The raw proportions are obtained after grouping students by their academic readiness score rounded to the nearest tenth. Raw proportions for groups with 50 or more students are shown in Figure A2.

Figure A2. Probability of Earning a College Degree, by Academic Readiness Score





ABOUT ACT

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