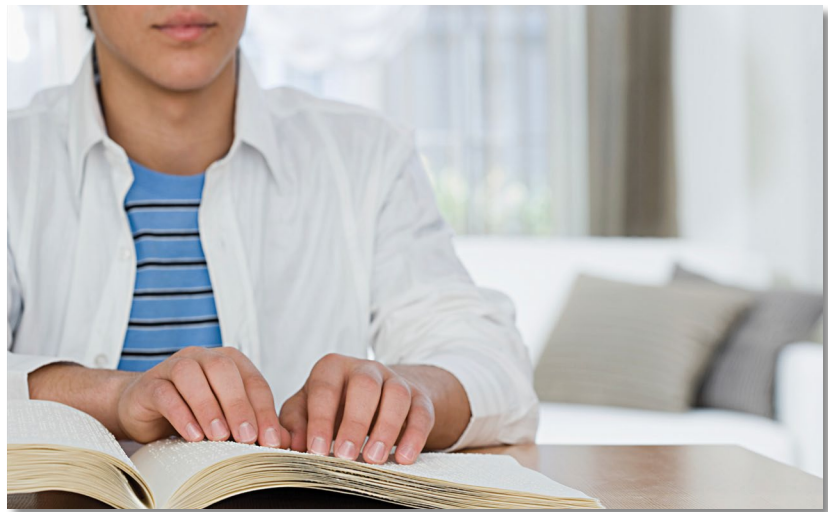


Examining the Validity of ACT® Composite Score and High School Grade Point Average for Predicting First-Year College GPA of Special-Tested Students



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Abstract

The current study is a replication of the study by Ziomek and Andrews (1996), which, for both regular-tested and special-tested students, examined the predictive validity of using a student's Composite score on the ACT® test and high school grade point average (GPA) jointly to predict the student's first-year college GPA. In addition to the joint prediction model, the current study examines two other prediction models for comparison purposes: a model using high school GPA alone, and a model using ACT Composite scores alone.

Two diagnosis subgroups (attention deficit and reading disability) and two extended time subgroups (up to time-and-a-half time and up to triple-time) of special-tested students had a sufficient sample size to be examined in the current analysis. The results for these subgroups were compared to those for regular-tested students enrolled in the same postsecondary institutions.

The results indicate that college GPA predictions jointly based on ACT Composite score and high school GPA are more accurate than predictions based on either variable alone. In contrast to using both predictors, using only one of the predictors (high school GPA or ACT Composite score) tends to result in bigger over-prediction of first-year college GPA for the special-tested subgroups. In a future study, the validity of the prediction models could be examined for several other accommodations provided to students, if sufficient sample sizes for different accommodations groups are available. Moreover, additional research is needed to evaluate how the number and types of services received in college by students with disabilities would affect study results.

Introduction

The state-led effort to develop the Common Core State Standards was launched in 2009. During the development process, the standards were divided into two categories: the college and career readiness standards and the K–12 standards (www.corestandards.org/about-the-standards/development-process/). The college and career readiness standards address what students are expected to know and understand by the time they graduate high school. From an academic perspective, college and career readiness means that high school graduates have the English and mathematics knowledge and skills needed to qualify for and succeed in the postsecondary job training and/or postsecondary education necessary for their chosen careers (www.achieve.org/college-and-career-readiness).

Measuring whether students acquired requisite skills and knowledge in their high school years provides data that helps set students on a successful career path. The ACT test is designed to measure the skills and knowledge important for success in postsecondary education that are acquired in secondary education. ACT provides each state with a report that details the college readiness of students who took the ACT (ACT, 2007; ACT, 2013). According to Clinedinst (2015), admission test scores such as ACT scores and high school GPA are reported as two of the most important factors to evaluate student entrance applications by many college and university admissions officers.

Several studies have documented a positive correlation between ACT scores and/or high school GPA and students' success in the first year of college (Noble & Sawyer, 2002; Noble & Sawyer, 2004; Allen & Scoring, 2005; Allen & Robbins, 2010; Allen, 2013; Sanchez, 2013; Sawyer, 2013; Westrick, Le, Robbins, Radunzel, & Schmidt, 2015). Based on a sample of students attending four-year postsecondary institutions, Allen and Robbins (2010) reported a correlation of 0.49 between first-year GPA and ACT Composite score, and a correlation of 0.51 between first-year GPA and high school GPA. Sawyer (2013) reported a median correlation of 0.48 between high school GPA and first-year college GPA, and a median correlation of 0.44 between ACT Composite score and first-year GPA. Sawyer indicated that using high school GPA and ACT Composite score jointly was more beneficial for improving success rates in predicting first-year college GPA than using only one of those two variables separately (for students with a high school GPA of 3.5 or higher or with an ACT Composite score of 22 or higher).

Like Sawyer's 2013 study, Sanchez (2013) and Radunzel & Noble (2012) demonstrated that ACT scores and high school GPA were jointly predictive of student success in college, and that models using both scores predicted more accurately than a single measure used alone. Maxey and Levitz (1980) examined the predictive validity of the ACT regression model in predicting the college GPA of regular-tested students; they reported a correlation of 0.59 between actual and predicted college GPA for regular-tested students. Additionally, Allen (2013) demonstrated that the probability of success in first-year credit-bearing courses increases as ACT scores increase.

The studies mentioned in previous paragraphs were all based on a regular-tested student population. However, demonstrating the validity of test scores or other factors in predicting college success for different student populations is necessary and important to ensure testing fairness. Since the

enactment of the Individuals with Disabilities Education Act (IDEA)¹ in 1975, the total percentage of students enrolled in public school with disabilities increased from 8.3 % (1976–1977) to 13.8% (2004–2005), and the percentages were above 13% from 2005 to 2011 (Snyder & Dillow, 2013). Reflective of the growing population of students with disabilities in public schools, the enrollment of students with disabilities in postsecondary education is growing (Newman et al. 2010; Snyder and Dillow, 2010). Because of the growing number of students with disabilities, it is important to demonstrate that a student's ACT scores and high school GPA are valid predictors for college success, not only for regular-tested students but also for students with disabilities.

ACT approves accommodations for examinees with disabilities in accordance with the Americans with Disabilities Act (ADA). To qualify for ACT-approved accommodations, necessary documentation needs to be submitted. Detailed information on the necessary documentation to submit, and the process for reviewing accommodations requests, can be found at www.act.org/content/dam/act/unsecured/documents/ACT-Policy-for-Documentation.pdf. ACT provides different accommodations according to the examinee's diagnosis and needs. Different accommodations include a large type test booklet, extended time, and alternate test formats, including Braille, DVDs, or a reader (www.actstudent.org/regist/disab/).

Some older studies have demonstrated the validity of ACT Composite score and high school GPA in predicting the first-year college GPA of students with disabilities. One example is a study by Laing and Farmer (1984) wherein they examined the predictive validity of self-reported high school grades and ACT assessment test scores in predicting the college GPA of students with disabilities. In their study, the correlation between the college-reported GPA and the predicted GPA based on ACT scores and high school GPA jointly was 0.39 for students with motor disabilities and 0.52 for students with visual disabilities. Laing and Farmer indicated that the predicted GPA tended to be slightly higher than actual GPA for special-tested students.

Ziomek and Andrews (1996) also investigated the predictive validity for both regular-tested and special-tested students. In their study, Ziomek and Andrews examined data from 2,959 special-tested students with a valid college GPA, a valid predicted GPA, and all four ACT scores. They obtained a prediction model for each postsecondary institution using the total student population that included both special-tested and regular-tested students. They studied three special needs categories: diagnosed disability (attention deficit disorder, dyslexia, and learning disabilities), test package (regular print, and audio cassette tape with regular print), and extended time—up to double-time on each of the English and mathematics tests and up to triple-time on each of the reading and science reasoning (now called science) tests; up to triple-time per test; and up to three hours per test. Their results revealed a small prediction bias indicating that the first-year college GPA was slightly over-predicted for special-tested students.

In addition to replicating the Ziomek and Andrews (1996) study—which employed a joint-prediction model using both ACT Composite score and self-reported high school GPA to predict college GPA—the current study examines two other prediction models for comparison purposes: a model based on high school GPA alone, and a model based on ACT Composite score alone.

¹ The Individuals with Disabilities Education Act (IDEA) mandates that children and youth with disabilities, ages 3–21, be provided a free and appropriate public school education.

Data and Analyses

In this study, the ACT accommodation records of 433,694 students who were given some type of testing accommodation from January 2009 to December 2013 were collected. The first-year college outcome data were provided by postsecondary institutions that participated in various ACT research services or partnerships. After ACT accommodation records were matched to the first-year college outcome data, the scores of 1,766 special-tested students who had a valid first-year college GPA and a valid ACT Composite score were retained for the analyses; these students were enrolled across 143 postsecondary institutions. The number of special-tested students enrolled in each postsecondary institution ranged from 1 to 185. The scores of 187,110 regular-tested students from these institutions were also retained. The number of regular-tested students enrolled in each postsecondary institution ranged from 39 to 8,901. All students, special-tested and regular-tested, had valid scores for three variables: high school GPA,² ACT Composite score,³ and college GPA.

The two disability subgroups with the largest sample sizes—attention deficit (N = 382) and reading disability (N = 883)—were studied. Two extended-time accommodations subgroups had sufficient sample sizes for analysis: up to triple-time on each test over multiple days (N = 652), and up to time-and-a-half time on each test over multiple days (N = 623). Overall, the four special-tested subgroups had more male students (59%) than female students (41%). The attention deficit subgroup had significantly more male students (68%) than female students (32%); the other three special-tested subgroups had approximately 60% male students and 40% female students. In contrast, the regular-tested group had more female students (56%) than male students (44%). The analyses focused on the aforementioned four subgroups.

Consistent with the Ziomek and Andrews study, the institution-specific regression equations for the total group of students were calculated, combining special-tested and regular-tested students from each institution. The institution-specific total-group regression parameters were then applied separately to the special-tested students and to the regular-tested students to obtain their predicted college GPAs. For each subgroup, a Pearson product-moment correlation between predicted college GPA and actual college GPA was calculated. The average prediction error (actual college GPA minus predicted GPA) of each special-tested subgroup was also compared with that of the regular-tested group.

² The high school GPA that was used in this study was the average grade across all grades (30 subjects) that students reported when they registered for the ACT.

³ The ACT Composite score used in the analyses was the most recent score if a student took the ACT test more than once.

Results

Descriptive statistics for different types of extended time accommodations and diagnosed disabilities are provided in Table 1. As seen in Table 1, the average ACT Composite score and high school GPA of special-tested students tend to be lower than those of regular-tested students.

Table 1. Descriptive Statistics for ACT Composite Score, High School GPA, and College GPA, by Testing Mode and Diagnosis Group

Group	Variable	Mean	SD	Min	Max
Testing Mode Groups					
Regular-Tested (N = 187,110)	ACT Composite Score	22.76	4.42	4.00	36.00
	High School GPA	3.41	0.51	0.33	4.00
	College GPA	2.74	0.97	0.00	4.00
All Special-Tested (N = 1,766)	ACT Composite Score	19.82	4.76	9.00	34.00
	High School GPA	2.95	0.63	0.00	4.00
	College GPA	2.27	1.06	0.00	4.00
Up to Triple-Time (N = 652)	ACT Composite Score	19.13	4.45	11.00	34.00
	High School GPA	2.95	0.61	0.50	4.00
	College GPA	2.30	1.01	0.00	4.00
Up to Time-and-a-Half (N = 623)	ACT Composite Score	20.14	4.54	9.00	33.00
	High School GPA	2.96	0.63	0.00	4.00
	College GPA	2.24	1.09	0.00	4.00
Diagnosis Groups					
Attention Deficit (N = 382)	ACT Composite Score	21.50	4.87	9.00	34.00
	High School GPA	2.86	0.64	0.00	4.00
	College GPA	2.16	1.10	0.00	4.00
Reading Disability (N = 883)	ACT Composite Score	18.85	4.16	11.00	34.00
	High School GPA	2.93	0.61	0.50	4.00
	College GPA	2.28	1.00	0.00	4.00

The predicted college GPA (see Table A1 in Appendix) jointly based on high school GPA and ACT Composite score has the highest correlation with the actual college GPA, followed by the prediction based on high school GPA only. For each prediction model, the correlation between predicted college GPA and actual college GPA is always higher for the regular-tested group than for each special-tested subgroup.

Table A1 also shows the descriptive statistics of the average residual values for different subgroups. The residual values were obtained by subtracting the predicted college GPA from the actual reported college GPA. The average actual college GPA is very similar to the average predicted GPA in the total regular-tested group, whereas the average actual college GPA tends to be slightly lower than the average predicted GPA in most of the special-tested subgroups. In other words, college GPA tends to be slightly over-predicted for the special-tested subgroups.

When the two extended time subgroups were compared, students who received an extension of up to triple-time had smaller absolute average residuals in predicting college GPA than students who received up to time-and-a-half. For both types of extended time (up to triple-time and up to time-

and-a half time), using both ACT Composite score and high school GPA to predict college GPA resulted in the smallest absolute residual mean.

For the two disability subgroups, the reading disability subgroup had smaller absolute average residuals than the attention deficit subgroup, especially when using ACT Composite score alone in the predictions; the difference between the absolute residual means between the two disability subgroups was 0.349 when ACT Composite score alone was used a predictor. For the reading disability subgroup, when both ACT Composite score and high school GPA were used for prediction, the absolute average residual was the smallest.

Analyses by Extended Time and Diagnosis, Jointly

The prediction validity for special-tested student subgroups defined by type of extended time and diagnosis jointly was also investigated. Results for these subgroups are provided in Table A2 in the Appendix. The attention deficit subgroup did not have any students who took the ACT in an up to triple-time condition.

The order of the predictor variable(s) based on the correlation within each special-tested subgroup in Table A2 is similar to that in Table A1, except for the reading disability subgroup; for the reading disability subgroup with up to triple-time, the correlation between predicted college GPA and actual GPA was higher when ACT Composite score was used alone than when high school GPA was used alone to predict college GPA. In the reading disability subgroup, college GPA was slightly over-predicted when only one of the scores was used as a predictor; on the other hand, the average residuals were positive and close to zero when both ACT Composite score and high school GPA were used, regardless of the type of extended time.

Summary and Discussion

The predictive validity of the ACT Composite score and high school GPA to predict first-year college GPA for the total group of special-tested students and for certain subgroups of special-tested students, defined by testing mode and diagnosis, was examined. Three different prediction models were examined: using both ACT Composite score and high school GPA jointly, using ACT Composite score alone, and using high school GPA alone.

Two diagnosis subgroups (attention deficit and reading disability) and two extended-time subgroups (up to time-and-a-half time and up to triple-time) of special-tested students had large enough sample sizes to be investigated separately.

Regression parameters for each institution were calculated for the total population containing both regular-tested and special-tested students. The correlation between predicted college GPA and actual college GPA, the average difference between these variables, and the average absolute difference between these variables were compared.

The results of this study can be summarized as follows:

First, ACT test scores were found to be positively-correlated with first-year college achievement for students with disabilities, though these correlations were somewhat lower than those found among regular-tested students. Study results also indicated that using high school GPA and ACT Composite

score jointly provided greater prediction validity among special-tested students, a finding also seen for regular-tested students in this study and reported by others (Laing & Farmer, 1984; Radunzel & Noble, 2012; Sawyer, 2013; Sanchez, 2013).

Second, college GPA tended to be slightly over-predicted for the overall group of special-tested students, a result that is consistent with previous research (Laing & Farmer, 1984; Ziomek & Andrews, 1996; Cahalan, Mandinach, & Camara, 2002). One exception was predicting college GPA using both ACT Composite score and high school GPA for the reading disability group; in this case, actual college GPA was similar to predicted GPA (within 0.02 GPA units). The actual college GPA seemed to be over-predicted especially when ACT Composite score was used alone for the prediction in the attention deficit group.

Bridgeman, McCamley-Jenkins, and Ervin (2000) found that first-year college GPA was over-predicted for male test takers and under-predicted for female test takers using the SAT alone or the SAT with high school GPA together as predictors for students without disabilities. A study by Cahalan, Mandinach, and Camara (2002) also found that the actual college GPA was under-predicted for female students without disabilities, whereas the college GPA was over-predicted for male students without disabilities using SAT scores alone and also using both SAT scores and high school GPA as a predictor. The over-prediction was much bigger for male students than for female students who had learning disabilities when the SAT was used alone as a predictor in Cahalan, Mandinach, and Camara's research. In the present study, the attention deficit group had many more male students than female students compared to other special-tested subgroups; additional research could be done to examine the validity of predicting college GPA using ACT Composite score for different subgroups (including gender, geographical region, race, or ethnicity).

In conclusion, as is the case for students without disabilities, using multiple test measurements provides a more accurate prediction of students' chances of succeeding in college. Specifically, this study found that a prediction model that uses both ACT Composite score and high school GPA is a good model to predict actual college GPA for both regular-tested and special-tested subgroups.

There are additional limitations to this study, including that the special-tested subgroups had a relatively small number of students with different disabilities or accommodations. In addition, it is possible that the institutions that provided GPA data might not be representative of institutions nationally; as a result, their special-tested students may not be representative of all special-tested students nationally. Also, each special-tested subgroup was selected because its sample size was relatively large compared to other special-tested subgroups; hence, the study results may not be generalizable to other special-testing subgroups that were not examined in this study. In addition, there was no detailed information on the severity of students' disabilities or on the availability of accommodations while students were in college.

In the future, predictive validity could be investigated based on the availability of accommodation while students are in college. In addition, different subgroups such as gender, geographical region, race, or ethnicity could be examined for the prediction validity of ACT Composite score and high school GPA. The validity of the prediction models could also be examined for other accommodations provided to students, if sufficient sample sizes for different accommodation groups are available. ■

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Appendix

Table A1. Distribution of Predicted GPA and Residual, by Testing Mode and Diagnosis Group

Group	Predictor Variable(s)	Predicted GPA				Residual				Correlation
		Mean	SD	Min	Max	Mean	SD	Min	Max	
Testing Mode Groups										
Regular-Tested (N = 187,110)	ACT Composite Score and High School GPA	2.74	0.54	0.00	4.00	0.0007	0.8048	-3.80	3.40	0.56
	ACT Composite Score	2.74	0.44	0.80	4.00	0.0016	0.8638	-3.80	2.60	0.45
	High School GPA	2.74	0.52	0.00	3.90	0.0001	0.8206	-3.70	3.60	0.53
Special-Tested (N = 1,766)	ACT Composite Score and High School GPA	2.32	0.61	0.00	3.80	-0.0470	0.9537	-3.20	2.80	0.45
	ACT Composite Score	2.45	0.50	1.00	3.90	-0.1810	0.9824	-3.30	2.60	0.38
	High School GPA	2.35	0.61	0.00	3.70	-0.0820	0.9822	-3.20	2.90	0.41
Up to Triple-Time (N = 652)	ACT Composite Score and High School GPA	2.27	0.60	0.00	3.80	0.0232	0.9038	-3.20	2.80	0.46
	ACT Composite Score	2.39	0.49	1.20	3.60	-0.0950	0.9094	-3.10	2.50	0.43
	High School GPA	2.32	0.61	0.00	3.70	-0.0270	0.9454	-3.10	2.90	0.40
Up to Time-and-a-Half (N = 623)	ACT Composite Score and High School GPA	2.32	0.60	0.00	3.80	-0.0750	0.9873	-3.00	2.50	0.44
	ACT Composite Score	2.48	0.47	1.00	3.80	-0.2410	1.0314	-3.10	2.60	0.34
	High School GPA	2.34	0.62	0.00	3.60	-0.1010	1.0102	-3.20	2.50	0.41
Diagnosis Groups										
Attention Deficit (N = 382)	ACT Composite Score and High School GPA	2.32	0.61	0.00	3.80	-0.1600	1.0504	-3.00	2.50	0.36
	ACT Composite Score	2.60	0.50	1.00	3.80	-0.4370	1.0810	-3.30	2.60	0.27
	High School GPA	2.28	0.61	0.00	3.60	-0.1140	1.0625	-2.90	2.60	0.34
Reading Disability (N = 883)	ACT Composite Score and High School GPA	2.26	0.58	0.00	3.80	0.0190	0.9060	-3.20	2.80	0.45
	ACT Composite Score	2.37	0.46	1.20	3.60	-0.0880	0.9267	-3.10	2.50	0.39
	High School GPA	2.33	0.60	0.00	3.70	-0.0460	0.9377	-3.10	2.90	0.40

Note: Red font color indicates the highest correlation. Blue font color indicates the second highest correlation. Boldface font indicates positive average residuals.

Table A2. Distribution of Predicted GPA and Residual, by Diagnosis and Testing Mode Jointly

Diagnosis and Testing Mode Group	Predictor Variable(s)	Predicted GPA				Residual				Correlation
		Mean	SD	Min	Max	Mean	SD	Min	Max	
Attention Deficit With Up to Time-and-a-Half (N = 285)	ACT Composite Score and High School GPA	2.33	0.62	0.00	3.80	-0.1414	1.0414	-3.00	2.50	0.41
	ACT Composite Score	2.59	0.48	1.00	3.80	-0.4007	1.0639	-3.10	2.60	0.34
	High School GPA	2.30	0.63	0.00	3.60	-0.1126	1.0700	-2.90	2.30	0.37
Reading Disability with Up to Triple-Time (N = 513)	ACT Composite Score and High School GPA	2.25	0.59	0.00	3.80	0.0327	0.9027	-3.20	2.80	0.44
	ACT Composite Score	2.38	0.47	1.20	3.60	-0.0986	0.9069	-3.10	2.50	0.41
	High School GPA	2.30	0.60	0.00	3.70	-0.0228	0.9379	-3.10	2.90	0.39
Reading Disability with Up to Time-and-a-Half (N = 289)	ACT Composite Score and High School GPA	2.29	0.56	0.20	3.50	0.0107	0.9058	-2.50	2.50	0.47
	ACT Composite Score	2.37	0.44	1.40	3.50	-0.0720	0.9591	-2.70	2.00	0.35
	High School GPA	2.37	0.59	0.00	3.60	-0.0689	0.9245	-2.80	2.40	0.45

Note: Red font color indicates the highest correlation. Blue font color indicates the second highest correlation. Boldface font indicates positive average residuals.



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