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July 6, 2020

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Author Note

The authors declare that there no conflicts of interest with respect to this preprint.

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This research was partially funded by a grant for the Institute for Educational Sciences (#R305A150193) and the Center for the Interdisciplinary Study of Language and Literacy at Northern Illinois University.

¹ In the regression with foundational skills, $R^2=.364$ and in the regressions with strategy use and motivation, $R^2=.368$.

Abstract

An alarming number of first year college students are underprepared, and in particular with respect to being ready to read in college. This study explored the factors that predict success on an academic literacy task and early academic success. Specifically, this study explores the extent that foundational skills associated with reading, strategy use, and motivation for reading account for variance in academic reading and early academic success over and above traditional indicators (i.e., ACT, HSGPA).

Keywords: Adult literacy, Individual Differences, Struggling Readers

Higher education faces a crisis in that a number of students who start college are not sufficiently ready to read to be successful in their courses (ACT, 2006; Baer, Cook, & Baldi, 2006) and ultimately fail to graduate with a degree (Bailey, Jeong, & Cho, 2010). College readiness to read certainly has an impact on the successful completion of reading literacy assignments and associated course work. However, more broadly, it compromises the development of disciplinary specific, higher level literacy skills that are often acquired through participation in college courses (Goldman et al., 2016; Shanahan & Shanahan, 2008). Unfortunately, many of the programs designed to support reading literacy outcomes, sometimes called developmental education, have a poor track record of success, and consequently are being defunded or there have been dramatic changes in how support is provided (Hodara & Jaggars, 2014).

Not being ready to read for college has implications for proximal and distal outcomes for students. By proximal outcomes, we mean performance on specific literacy tasks that might be reflective of what occurs in introductory college courses. By distal outcomes we mean early college success. In the present study we are interested in assessing the factors that are predictive of performance on a literacy task and early academic performance (as measured by GPA over three college semesters within the first two years of college).

We distinguished between three sets of factors. The first was traditional measures of college readiness, which involved performance on a standardized college readiness test, the ACT and high school GPA (Radunzel & Noble, 2012). The second was proficiency in the foundational skills that support readings (word recognition, morphological knowledge, word processing, proficiency in sentence processing, text comprehension. The third set of factors

pertained to aspects of the readers that support processing and are aligned with self-regulation. Specifically, these involve motivation to read and awareness of metacognitive strategies.

Overview of Study and Research Questions

The goal of the study was to explore the extent to which the reading proficiency and supporting factors account for variance over and above traditional measures in proximal and distal outcomes.

1. Do reading literacy skills, perceived strategy use, and motivation account for variance on an academic literacy task over and above traditional measures of academic success (ACT, GPA)?
2. Do reading literacy skills, perceived strategy use, and motivation account for variance in early academic performance (first three semesters in college over and above traditional measures of academic success (ACT, GPA)?

Additionally, we explored the extent to which the status of students who were designated as needing developmental reading support influenced these relationships

Methodology

Participants

There were 214 participants at a midwestern, 4-year institution who were enrolled in a reading and study strategies course. Of these 120 participants enrolled in the course as part of their participation in a developmental education program for non-traditionally admitted students.

Measures

Academic literacy task . Global Integrated Scenario-Based Assessment (GISA; Sabatini et al., 2019).

Early academic success. Cumulative three Semester GPA starting with semester of participation.

Foundational skills. Study Aid and Reading Assessment (SARA) (Sabatini et al, 2015): word recognition/decoding, vocabulary, morphology, sentence processing, efficiency in reading, reading comprehension.

Reading Motivation Measure (RMM). Items were from the Adaptive Reading Motivation Measure (ARMM; Kingston et al., 2017), designed for adolescent readers.

Strategy use - Metacognitive Awareness of Reading Strategies Inventory (MARSIS) (Mokhtari & Reichard, 2002, 2004). MARSIS has three subscales: Global strategies were are general strategies that support meaning making, such as close reading, summarizing, questioning; Problem solving strategies are those used to repair or solve problems in understanding when tasks and texts become challenging; Support strategies, which are using outside tools and strategies, such as note taking and annotation.

Procedure

Assessments were administered over two sessions in a laboratory setting, early in the semester.

Results

There were two sets of questions to address the two research questions. Each set involved two step, hierarchical regression analysis in which the traditional measures were entered first, and the variables of interest for the research questions were entered second. It is beyond the scope of this conference paper to describe each analysis in detail. Demographics for the sample

are shown in Table 1 and descriptive statistics are provided in Table 2. Tables showing the regression results for each analysis are available in the appendix.

Table 1

Demographics for the sample n=214

DE program enrollment	120
Female	142
Male	73
Age 18-22	201
Age 23-25	3
English Not first Language	22
Race/Ethnicity	
Black/African American	113
White	68
Hispanic	44
Asian	3
Native Hawaiian/ Pacific Islander	1
American Indian/Alaska Native	1

RQ1: Do reading literacy skills, perceived strategy use, and motivation account for variance on an academic literacy task over and above traditional measures of academic success (ACT, HSGPA)?

When ACT and HSGPA were entered in the first step in each regression predicting academic literacy task performance, they accounted for a significant 36-37%¹ of the variance ($p < .001$). Both measures were significant predictors of academic literacy task performance (ACT: $B = .65$, $p < .001$; HSGPA: $B = 1$, $p = .05$).

¹ In the regression with foundational skills, $R^2 = .364$ and in the regressions with strategy use and motivation, $R^2 = .368$.

Table 2

Descriptive Statistics

	N	Min	Max	Mean	Std. Dev
SARA Word	214	18.00	52.00	39.94	8.00
SARA Vocabulary	214	13.00	35.00	28.15	4.72
SARA Morphology	214	8.00	37.00	31.27	5.57
SARA Sentence Processing	214	7.00	25.00	21.33	3.44
SARA Efficiency of Comp	214	14.00	43.00	39.08	5.69
SARA Read Comp	214	1.00	19.00	12.78	4.22
GISA	215	5.00	27.00	17.76	4.85
MARSI Global	215	1.00	5.00	3.44	0.59
MARSI Problem Solving	215	1.00	5.00	3.79	0.64
MARSI Support	215	1.00	5.00	3.34	0.70
Reading Motivation	215	1.60	6.00	4.17	0.98
High School GPA	216	1.88	4.07	3.07	0.59
ACT	214	13.00	33.00	19.81	4.03
Sem 3 Cumulative GPA	168	1.44	4.00	2.88	0.56

Foundational skills and academic literacy task. When the six foundational skills measures were added in step 2, it explained an additional 20% of the variance in academic literacy task performance over and above ACT and HSGPA ($\Delta R^2=.197$, $F_{\Delta(6, 203)}=15.23$, $p<.001$). Of the foundational skill measures, only SARA Vocabulary ($B=.32$, $p<.001$) and SARA Reading Comprehension ($B=.35$, $p<.001$) were significant predictors. After adding the step 2 predictors, HSGPA was no longer a significant predictor of academic literacy task

performance while ACT remained significant ($B=.21, p=.01$). Together these factors explained 56 % of variance in academic literacy task performance.

Perceived Strategy Use and academic literacy tasks. When the three strategy use variables were added in step 2, there was a non-significant trend suggesting strategy use may have accounted for an additional 2% of the variance in academic literacy task performance over and above ACT and HSGPA ($\Delta R^2=.02, F_{\Delta(3, 207)}=2.32, p=.08$). MARS Problem Solving ($B=1.57, p=.01$) had a significant relationship with academic literacy task performance and both of the traditional predictors remained significant in step 2 (ACT: $B=.65, p<.001$, HSGPA: $B=.90, p=.08$). Together these factors explained 39 % of variance in academic literacy task performance.

Reading Motivation and academic literacy task. The addition of the motivation variable in step 2, did not account for a significant increase in variance over and above ACT & HSGPA ($\Delta R^2=.001, F_{\Delta(1, 209)}=.31, p=.58$). Only ACT ($B=.65, p<.001$) and HSGPA ($B=1.01, p=.05$) were significant in step 2. The full model explained 37 % of variance in academic literacy task performance.

RQ2: Do reading literacy skills, perceived strategy use, and motivation account for variance early academic performance (first three semesters in college over and above traditional measures of academic success (ACT, HSGPA))?

When ACT and HSGPA were entered in the first step in each regression predicting early academic performance (three semester cumulative GPA) they accounted for a significant 35% of

the variance ($p < .001$). Both variables were significant predictors (ACT: $B = .05$, $p < .001$; HSGPA: $B = .33$, $p < .001$).

Foundational Skills and Early Academic Performance. When the six Foundational Skills measures were added in step 2, they explained an additional 2.9 % of variance in the model. However, this was not a significant increase over and above ACT and HSGPA ($\Delta R^2 = .029$, $F_{\Delta(6, 157)} = 1.197$, $p = .311$). Both ACT ($B = .03$, $p = .01$) and HSGPA ($B = .31$, $p < .001$) were significant in step 2. The full model explained 38 % of variance in early academic performance.

Perceived Strategy Use and Early Academic Performance. In step 2 the addition of the three perceived strategy use measures accounted for a significant 3% increase in variance explained over and above ACT and HSGPA ($\Delta R^2 = .03$, $F_{\Delta(3, 161)} = 2.69$, $p = .048$). The MARSII Problem Solving measure ($B = .21$, $p = .01$) had a significant positive relationship with early academic performance. Unexpectedly, MARSII Global Strategy Use ($B = -.21$, $p = .03$) had a significant negative relationship with early academic performance. Both ACT ($B = .05$, $p < .001$) and HSGPA ($B = .32$, $p < .001$) remained significant. Together these factors explained 38% of the variance in early academic performance.

Reading Motivation and early academic performance. The addition of the reading motivation variable in step 2, accounted for an additional 1% increase in variance explained, but this was not a significant increase over and above ACT and HSGPA ($\Delta R^2 = .01$, $F_{\Delta(1, 163)} = 1.98$, $p = .161$). Both ACT ($B = .05$, $p < .001$) and HSGPA ($B = .33$, $p < .001$) remained significant. The full model explained 36 % of variance in early academic performance.

Exploratory Analyses with Developmental Education status (DE)

As an additional exploratory analysis, we looked at whether students' designation as not ready for college reading explained additional variance in the proximal and distal outcomes over and above HSGPA and ACT.

DE with traditional predictors and academic literacy task performance. In step 1, DE enrollment had a significant negative relationship with performance on the academic literacy task ($B=-4.861$, $p<.001$) and accounted for significant variance in academic literacy task performance ($R^2=.25$, $F_{(1, 211)}=70.12$, $p<.001$). In step 2, adding ACT and HSGPA explained a significant 3.7 % of variance over and above DE status ($\Delta R^2=.121$, $F_{\Delta(2, 209)}=20.09$, $p < .001$) and the effect of DE status was no longer significant. In step 2, HSGPA was no longer a significant predictor, however, ACT ($B=.59$, $p<.001$) remained a significant predictor of academic literacy task performance. The full model explained 62 % of variance in academic literacy task performance.

DE with traditional predictors and early academic performance. In step 1, DE enrollment had a significant negative relationship with early academic performance ($B= -.548$, $p<.001$) and explained a significant amount of variance ($R^2=.24$, $F_{(1, 165)}=52.00$, $p<.001$). Adding ACT and HSGPA in step 2 added a significant 1.2% increase in variance explained ($\Delta R^2=.118$, $F_{\Delta(2, 163)}=15.00$, $p < .001$) and the effect of DE was no longer significant. Both ACT ($B=.038$, $p=.005$) and HSGPA ($B=.308$, $p<.001$) significantly predicted early academic performance . The full model explained 36% of variance in early academic performance.

Discussion

The goal of the present study was to explore factors of students that are predictive of their success on an academic literacy task and early academic performance, and in particular over and above the factors that are typically assessed to predict college readiness. The results of the present study suggest that vocabulary, proficiency in comprehending texts, the propensity to overcome comprehension problems were predictive of performance on the academic literacy task. With respect to early academic performance, only the propensity to overcome comprehension problems was a significant predictor over and above the traditional measures of college readiness.

These results have important implications for college success. It has been shown that in community colleges, proficiency in word decoding and fluency account for the most variance in performance on comprehension tests (Ari, 2016). This may stem from the fact that community colleges are open access institutions and do not restrict access based on test scores. In contrast, four-year institutions typically do, which was the case at the institution for which this study was conducted. The nature of the support with respect to foundational skills may vary as a function institution, albeit there are certainly challenges in providing support for foundational skills in college.

The fact that problem solving skills were positively correlated with both performance on the literacy task and early college success is meaningful. Many programs to support underprepared readers focus on promoting general study and reading strategies, such as

summarization, question answering, previewing the texts (Armstrong & Lampi, 2017).

However, this study suggests that teaching students how to recognize and remediate comprehension challenges is an important skill for college success.

We conclude by suggesting that studying the factors that are associated with college success may require one to both assess proximal and distance outcomes. Early college success is built upon success that students experience in the literacy activities that are part of their coursework. As such, helping students succeed on those will increase the likelihood that they will experience success in the first two years of college.

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Appendix

Regression tables

Foundational skills and academic literacy

Model	R	R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.60	.36	.36	59.93	2	209	.000
2	.75	.56	.20	15.23	6	203	.000

	B	Std. Error	Beta	t	Sig.
Step 1:					
ACT	0.65	0.08	0.54	8.64	0.00
HSGPA	1.00	0.52	0.12	1.94	0.05
Step 2:					
ACT	0.21	0.08	0.17	2.49	0.01
HSGPA	0.50	0.45	0.06	1.11	0.27
SARA Word	0.02	0.04	0.03	0.42	0.67
SARA Vocab	0.32	0.08	0.31	3.96	0.00
SARA Morph	-0.05	0.06	-0.05	-0.71	0.48
SARA Sentence	0.13	0.11	0.09	1.18	0.24
SARA Efficiency	-0.01	0.07	-0.01	-0.18	0.86
SARA Read Comp	0.35	0.08	0.30	4.27	0.00

Perceived Strategy Use and Academic Literacy

Model	R	R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.61	.37	.37	61.14	2	210	.00
2	.62	.39	.02	2.32	3	207	.08

	B	Std. Error	Beta	t	Sig.
Step 1					
ACT	0.65	0.08	0.54	8.69	0.00
HSGPA	1.00	0.52	0.12	1.94	0.05
Step 2					
ACT	0.65	0.08	0.54	8.29	0.00
HSGPA	0.90	0.51	0.11	1.76	0.08
MARSI_GL	-0.66	0.76	-0.08	-0.87	0.39
MARSI_PS	1.57	0.61	0.21	2.58	0.01
MARSI_SS	-0.35	0.63	-0.05	-0.55	0.58

Reading Motivation and academic literacy task

Model	R	R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.61	.37	.37	61.14	2	210	.00
2	.61	.37	.00	.314	1	209	.58

	B	Std. Error	Beta	t	Sig.
Step 1:					
ACT	0.65	0.08	0.54	8.69	0.00
HSGPA	1.00	0.52	0.12	1.94	0.05
Step 2:					
ACT	0.65	0.08	0.54	8.59	0.00
HSGPA	1.01	0.52	0.12	1.95	0.05
Reading Motivation	0.15	0.27	0.03	0.56	0.58

Foundational Skills and Early Academic Performance

Model	R	R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.59	.35	.35	43.48	2	163	.00
2	.61	.38	.03	1.20	6	157	.31

	B	Std. Error	Beta	t	Sig.
Step 1:					
ACT	0.05	0.01	0.34	4.79	0.00
HSGPA	0.33	0.07	0.34	4.79	0.00
Step 2:					
ACT	0.03	0.01	0.25	2.69	0.01
HSGPA	0.31	0.07	0.32	4.22	0.00
SARA Word	0.00	0.01	-0.01	-0.09	0.93
SARA Vocab	0.02	0.01	0.12	1.10	0.28
SARA Morph	-0.01	0.01	-0.06	-0.65	0.52
SARA Sentence	0.00	0.02	0.00	0.01	0.99
SARA Efficiency	0.01	0.01	0.05	0.47	0.64
SARA Read Comp	0.01	0.01	0.11	1.07	0.29

Perceived Strategy Use and Early Academic Performance

Model	R	R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.59	.35	.35	44.72	2	164	.00
2	.62	.38	.03	2.69	3	161	.048

	B	Std. Error	Beta	t	Sig.
Step 1:					
ACT	0.05	0.01	0.35	4.82	0
HSGPA	0.33	0.07	0.35	4.81	0
Step 2:					
ACT	0.05	0.01	0.37	4.98	0
HSGPA	0.32	0.07	0.34	4.71	0
MARSI_GL	-0.21	0.1	-0.21	-2.16	0.03
MARSI_PS	0.21	0.08	0.23	2.59	0.01
MARSI_SS	0.01	0.08	0.02	0.16	0.87

Reading Motivation and Early Academic Performance

Model	R	R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.59	.35	.35	44.72	2	164	.00
2	.60	.36	.01	1.98	1	163	.16

	B	Std. Error	Beta	t	Sig.
Step 1:					
ACT	0.05	0.01	0.35	4.82	0.00
HSGPA	0.33	0.07	0.35	4.81	0.00
Step 2:					
ACT	0.05	0.01	0.35	4.94	0.00
HSGPA	0.33	0.07	0.35	4.82	0.00
Reading Motivation	-0.05	0.04	-0.09	-1.41	0.16

DE with traditional predictors and academic literacy task

Model	R	R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.50	0.25	0.25	70.02	1	211	0
2	.61	0.37	0.12	20.09	2	209	0

	B	Std. Error	Beta	t	Sig.
Step 1:					
DE enrollment	-4.86	0.58	-0.50	-8.37	0.00
Step 2:					
DE enrollment	-0.73	0.85	-0.08	-0.86	0.39
ACT	0.59	0.10	0.49	5.92	0.00
HS_GPA	0.85	0.55	0.10	1.55	0.12

DE with traditional predictors and Early Academic Performance

Model	R	R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.49	0.24	0.24	52.00	1	165	0
2	.60	0.36	0.12	15.00	2	163	0

	B	Std. Error	Beta	t	Sig.
Step 1:					
DE enrollment	-0.55	0.08	-0.50	-7.21	0
Step 2:					
DE enrollment	-0.12	0.11	-0.11	-1.11	0.27
ACT	0.04	0.01	0.27	2.87	0.005
HS_GPA	0.31	0.07	0.32	4.23	0