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CBMs and Postsecondary Students with Developmental Disabilities: Examining Technical Adequacy

John L. Hosp, Jeremy W. Ford, Kiersten Hensley, Sally M. Huddle

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Leaders. Scholars. Innovators.

Benefits of College

- Higher pay
  - $55,700 vs. $33,800
- Lower unemployment rates
  - 2.6 times higher for age 20-24 with HS diploma
- Not just financial
  - Better health, community participation, independence, self-esteem

(Baum, Ma, & Payea, 2010)

Postsecondary Opportunities for Students with DD

- Less likely than non-disabled peers to:
  - enroll in postsecondary programs
  - gain employment
  - remain employed

(Wagner, Newman, Cameto, Garza, & Levine, 2005)

Postsecondary Opportunities for Students with DD

- 73% higher weekly income for students with DD who complete a postsecondary program

(Migliore, Butterworth, & Hart, 2009)

Increasing Opportunities

- Emphasis on transition planning
  - 4 out of 5 HS students with disabilities (Cameto, Levine, & Wagner, 2004)
- Over 200 programs in US and Canada (Think College, 2014)
- Traditional degree, certificate programs, other alternative plans (Pampay & Bambara, 2012)

Academic Focus

- Research demonstrating the continued need for academic interventions (e.g., Hua et al., 2012; Woods-Groves et al., 2012)
- Sensitive measures of performance and progress
- Formative use of data (Hosp, 2011)

Curriculum-Based Measurement (CBM)

- Developed from Institute for Research on Learning Disabilities at the University of Minnesota
- Reading, written expression, spelling, mathematics
- Dynamic indicators of basic skills (DIBS) (Shinn, 1989)
- Designed to use in making instructional decisions (Hintze & Silberglitt, 2005)

Purpose

- What is the technical adequacy of CBM with postsecondary students with intellectual disabilities?
- Does grade level of passage impact reading rate? Prediction? Preference?

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Method

Participants

- 45 postsecondary students
- Cognitive/intellectual disabilities
- 37.8% female (n = 17)
- 95.6% white (n = 43)
- Ages 18–25 yrs.
- Enrolled in the Realizing Education and Career Hopes program at The University of Iowa (UI REACH)

UI REACH – 2 yr. certificate program

- Includes: courses, campus life, career prep, post-grad support

Instruments

- CBMs used were part of the AIMSWeb suite (Pearson Education, 2012)
- 2nd, 4th ,and 6th grade reading materials
- 5th grade math materials

Slide 11

K3 Emailed Katelyn and Jo to see if there is a particular photo or graphic representation that they would prefer we use with the description of the program.
Kiersten, 3/22/2013

Instruments- CBM

Oral Reading Fluency (ORF)

- Words read correctly and errors
- Validity .60 to .80; Reliability .82-.99 (Reschly, Busch, Betts, Deno, & Long, 2009)

Maze

- Correct restorations and errors
- Validity .60-.86; Reliability .68-.90 (Wayman, Wallace, Wiley, Ticha, & Espin, 2007)

Instruments- CBM

Math Computation (M-COMP)

- Correct digits and correct problems
- Reliability .83-.93 (Foegen, Jiban, & Deno, 2007)

Math Concepts and Application (M-CAP)

- Correct problems and points
- Reliability .80-.88 (Pearson Assessment, 2009)

Instrument – Criterion

Woodcock-Johnson III Tests of Achievement
(WJIII; Woodcock, McGrew, & Mather, 2001)

- Broad Reading:
  - Letter Word Identification
  - Reading Fluency
  - Passage Comprehension
- Broad Math:
  - Calculation
  - Math Fluency
  - Applied Problems

Procedures

- Standardized procedures
- CBM measures administered during regularly scheduled class time within one week
- WJIII data collected by REACH staff within the past year

Data Analysis

- Two stages for technical adequacy
  - Descriptive statistics on each metric
  - Bivariate correlations between each CBM and content-appropriate criterion measure (both cluster and individual)
    - Meng's z to compare correlations to determine better predictors

Data Analysis

- Two stages for examining grade level of passage
  - One-way ANOVA to determine if WRC differed given order the passage was read
  - General Linear Modeling to determine if differences existed in WRC given grade level of passage

Data Analysis

- Examining student self-report of favorite passage

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Results

Descriptive Statistics

Reading CBM

Measure	Metric	Mean	SD	Skewness	Kurtosis
Grade 2 OPR	WRC	135.38	47.01	-0.30	-0.70
	Errors	3.49	5.05	2.38	6.29
Grade 4 OPR	WRC	130.80	54.93	0.99	3.56
	Errors	3.42	4.80	2.88	10.75
Grade 6 OPR	WRC	134.78	48.78	-0.35	-0.46
	Errors	3.51	4.28	2.14	4.84
Maze	CR	15.58	10.58	0.92	0.56
	Errors	2.33	3.40	3.16	11.01
M-COMP	CD	24.60	15.89	0.48	-0.16
	CP	7.82	5.97	0.85	1.62
M-CAP	CP	5.33	4.04	0.73	0.21
	Pts.	5.98	5.07	1.30	2.31

Note: n = 45. OPR = oral passage reading; WRC = Words Read Correct; CR = Correct Restorations; M-COMP = Math Computation; M-CAP = Math Concepts & Applications CD = Correct Digits, CP = Correct Problems, Pts. = Points.

Math CBM

Measure	Metric	Mean	SD	Skewness	Kurtosis
M-COMP	CD	24.60	15.89	0.48	-0.16
	CP	7.82	5.97	0.85	1.62
M-CAP	CP	5.33	4.04	0.73	0.21
	Pts.	5.98	5.07	1.30	2.31

Note: n = 45. M-COMP = Math Computation; M-CAP = Math Concepts & Applications CD = Correct Digits, CP = Correct Problems, Pts. = Points.

Criterion--WJIII

Measure	Test	Mean	SD	Skewness	Kurtosis
WJIII	Broad Reading	76.53	16.68	-0.75	1.35
	Letter Word ID	80.82	16.47	-0.74	1.75
	Passage Comprehension	80.20	17.45	-0.47	0.55
	Broad Math	61.62	21.92	-0.53	0.15
	Calculation	65.82	23.89	-0.43	0.20
	Math Fluency	65.00	18.05	.04	-0.55
	Applied Problems	71.00	16.50	-0.40	-0.41

Note: n = 45. WJIII = Woodcock Johnson Tests of Academic Achievement; ID = Identification.

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Results

Correlations

CBMs

Correlations between CBMs

CBM Measure	Grade 2 ORF	Grade 4 ORF	Grade 6 ORF	Maze	M-COMP CD	M-COMP CP	M-CAP CP	M-CAP Pts.
Grade 2 OPR	1.00	.882	.965	.773	.500	.484	.673	.641
Grade 4 OPR		1.00	.884	.763	.524	.530	.552	.545
Grade 6 OPR			1.00	.779	.557	.546	.661	.651
Maze				1.00	.448	.438	.569	.566
M-COMP CD					1.00	.960	.767	.745
M-COMP CP						1.00	.698	.709
M-CAP CP							1.00	.965
M-CAP Pts.								1.00

Note. n = 45. OPR = Oral Passage Reading; M-COMP = Math Computation; M-CAP = Math Concepts & Applications CD = Correct Digits, CP = Correct Problems, Pts. = Points.

Reading

Correlations between Reading CBMs and Criterion Measure

CBM Measure	WJIII Broad Reading	WJIII Letter Word ID	WJIII Reading Fluency	WJIII Passage Comprehension
Grade 2 OPR	.828 (<.001)	.842 (<.001)	.693 (<.001)	.653 (<.001)
Grade 4 OPR	.721 (<.001)	.712 (<.001)	.669 (<.001)	.552 (<.001)
Grade 6 OPR	.846 (<.001)	.831 (<.001)	.760 (<.001)	.672 (<.001)
Maze	.762 (<.001)	.717 (<.001)	.723 (<.001)	.612 (<.001)

Note. n = 45. WJIII = Woodcock Johnson Tests of Academic Achievement-Third Edition; OPR = Oral Passage Reading; ID = Identification.

Reading (continued)

Comparison between Correlations of Reading CBMs and Criterion Measure, Meng's z

CBM Measure	WJIII Broad Reading	WJIII Letter Word ID	WJIII Reading Fluency	WJIII Passage Comprehension
Grade 2 OPR to Grade 4 OPR	-0.142	0.862	**-2.119****	0.230
Grade 2 OPR to Grade 6 OPR	**-1.771***	-0.980	**-2.348****	-1.234
Grade 2 OPR to Maze	1.429	**2.450****	0.225	0.094
Grade 4 OPR to Grade 6 OPR	**-1.775***	**-1.983****	-0.310	-1.588
Grade 4 OPR to Maze	1.489	**2.044****	1.225	-0.012
Grade 6 OPR to Maze	**2.319****	**2.958*****	1.341	0.659

Note. n = 45. WJIII = Woodcock Johnson Tests of Academic Achievement-Third Edition; OPR = Oral Passage Reading ID = Identification; *p < .1; **p < .5; ***p < .01.

Math

Correlations between Math CBMs and Criterion Measure

CBM Measure	WJIII Broad Math	WJIII Math Calculation	WJIII Math Fluency	WJIII Applied Problems
M-COMP CD	.803 (<.001)	.789 (<.001)	.744 (<.001)	.701 (<.001)
M-COMP CP	.818 (<.001)	.800 (<.001)	.771 (<.001)	.718 (<.001)
M-CAP CP	.761 (<.001)	.742 (<.001)	.637 (<.001)	.705 (<.001)
M-CAP Pts.	.751 (<.001)	.735 (<.001)	.650 (<.001)	.692 (<.001)

Note. n = 45. WJIII = Woodcock Johnson Tests of Academic Achievement-Third Edition; M-COMP = Math Computation; M-CAP = Math Concepts & Applications CD = Correct Digits, CP = Correct Problems, Pts. = Points.

Math (continued)

Correlations between Math CBMs and Criterion Measure, Meng's z

CBM Measure	WJIII Broad Math	WJIII Math Calculation	WJIII Math Fluency	WJIII Applied Problems
M-COMP CD to M-COMP CP	-0.600	-0.422	-0.961	-0.559
M-COMP CD to M-CAP CP	0.710	0.761	1.500	-0.057
M-COMP CP to M-CAP CP	0.900	0.864	**1.726***	0.168
M-COMP CD to M-CAP Pts.	0.838	0.837	1.275	0.121
M-COMP CP to M-CAP Pts.	1.055	0.973	1.600	0.337
M-CAO CP to M-CAP Pts.	0.379	0.257	-0.419	0.449

Note. n = 45. WJIII = Woodcock Johnson Tests of Academic Achievement-Third Edition; M-COMP = Math Computation; M-CAP = Math Concepts & Applications CD = Correct Digits, CP = Correct Problems, Pts. = Points; *p < .1; **p < .5; ***p < .01.

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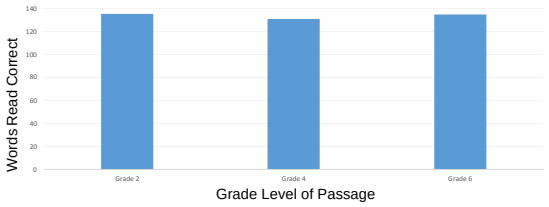
Results

Repeated Measures ANOVA

Effect of Passage Difficulty Level on OPR Rate



There was not a significant effect for difficulty level of reading passages, Wilks' Lambda = .969, F (2, 43) = .689, p = .507.

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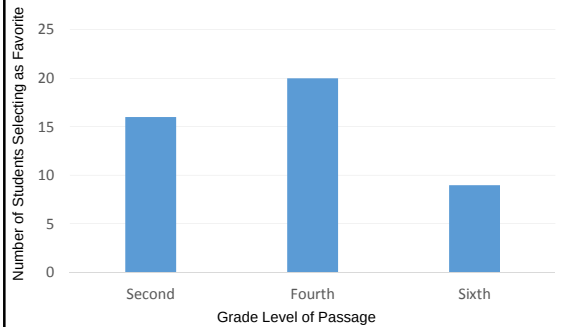
Results

Preference

Reading CBM



Findings—Technical Adequacy

- Similar to previous study (Hosp, Ford, Hensley, & Huddle, in review)
- Better prediction of Passage Comprehension (.36/.57 to .55/.61)
- OPR & Maze no changes in differential prediction

Findings—Technical Adequacy

- M-COMP better prediction
  - Broad Math (.67/.69 to .80/.81)
  - Applied Problems (.39/.46 to .70/.71)
- M-COMP & M-CAP differences for Applied Problems not present

Findings—Grade Level of Passage

- Reading Rate
  - No differences
- Prediction
  - Grade 6 seemed best overall
    - > Grade 4 for Broad Reading, Letter-Word ID, and Passage Comprehension
    - > Grade 2 for Reading Fluency
    - > Maze for Letter-Word ID
- Preference
  - Grade 4

Limitations

- Sample not nationally representative or random
- Relatively small sample size
- Use of single probe/passage

Conclusions

- Increasing number of students with ID entering postsecondary programs
- Continuing need for academic focus
- Appropriate tools for this population
- Higher grade level of reading material offers slightly better overall prediction