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## Curriculum-Based Measures in Mathematics: An Updated Review of the Literature

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# Curriculum-Based Measures in Mathematics: An Updated Review of the Literature

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## Abstract

The purpose of this document is to provide readers with the coding protocol that authors used to code 96 studies that focused on Stages 1, 2, and/or 3 of curriculum-based measurement in mathematics (CBM-M) research. Stage 1 refers to evidence for using CBM at one point in time (i.e., static scores), such as for screening for difficulty. Stage 2 refers to evidence for using CBM repeatedly overtime, such as for progress monitoring. Stage 3 focuses on the instructional utility of CBM (i.e., instructional decisions to increase student achievement). The purpose of the systematic review was to update the Foegen et al., (2007) literature review on CBM-M. We evaluated 96 studies published since 2006 that included more than 540,000 participants. Nearly all studies ( $k = 83$ ) reported results related to Stage 1, fewer studies reported results related to Stage 2 ( $k = 39$ ) and Stage 3 ( $k = 4$ ). The results of the systematic review report findings related to reliability, criterion validity, diagnostic accuracy, growth rates, and instructional utility of CBM-M.

This systematic review is currently under review at a peer-reviewed journal.

*Keywords:* systematic review, curriculum-based measurement, math, progress monitoring, screening.

## Curriculum-Based Measurement-Mathematics Systematic Review Coding Protocol

### Sections

1. Basic Study Information (p. 2)
2. Child Demographics (p. 3)
3. Reliability (p. 10)
4. Criterion Validity (p. 12)
5. Diagnostic Accuracy (p. 13)
6. Stage 3 (p. 15)

### Basic Study Information

Variable Name	Code Options	Code Descriptions
Authors	Names	All authors' last names, separated by commas
Year	Year	Year of publication
Journal	Journal name, Dissertation	Record the journal name. <ul style="list-style-type: none"> <li>● If the item is a dissertation, record "Dissertation"</li> </ul>
Publication Type	Select <b>one</b> : 0 = journal article 1 = dissertation, thesis	Codes defined as: <ul style="list-style-type: none"> <li>● peer reviewed journal = any study from a research journal; this will be the majority of articles</li> <li>● dissertation, thesis = any study that is titled dissertation or thesis; will have a university noted that the student is from</li> </ul>
Location Code	Select <b>one</b> : 0 = not reported 1 = United States (US) 2 = Non-US	<ul style="list-style-type: none"> <li>● Not reported = the authors did not report where the study took place</li> <li>● U.S. = The data for the study were collected in the U.S., including territories.</li> <li>● Non-U.S. = The data in the study were collected in a country other than the U.S.</li> </ul>
Location	Name	<ul style="list-style-type: none"> <li>● Anecdotally report the location of the study with the most description you can find (e.g., U.S., Midwest section of the U.S., a southern state in the U.S., France, Europe, Chile, etc.)</li> </ul>

### Child Demographics: Group Level

Cell	Variable Name	Code Options	Code Descriptions
	Child Sample Size	Number	<ul style="list-style-type: none"> <li>Record the total number of children who participated in the study after attrition and missing data were taken into account (i.e., at the end of the study, how many children were included in the analyses?)</li> </ul>
<p><b>NOTE:</b> There are several ways in which age or grade may be reported, which is why there are several options in this section. There are two important notes:</p> <ul style="list-style-type: none"> <li>The format that we want for years is a numeral and decimal (e.g., 4.5 years). <ul style="list-style-type: none"> <li>Authors may provide this and/or report the number of years and months (e.g. “average age was 4 years, 6 months”). If this is the case, you will need to convert the months portion of the age to the proportion of years (6 months/12 months = .5 years).</li> <li>If authors provide the average or range of years in total months (e.g., 54.6 months), then you need to convert this to years (e.g. 54.6/12 = 4.55 years).</li> </ul> </li> </ul>			
	Child Average Age	Number in years or NR	<ul style="list-style-type: none"> <li>Report the average age as a numeral (e.g., 14.5 for 14.5 years)</li> <li>Use NR for average age Not Reported.</li> </ul>
	Child Age Range	Number in years or NR	<ul style="list-style-type: none"> <li>Report the range of ages included (8.0 – 10.5)</li> <li>Use NR for range in age Not Reported.</li> </ul>
	Child Grade Levels at the <b>START</b> of the study	Record <b><u>all that apply</u></b> Not reported PreK/Preschool Kindergarten First Grade Second Grade Third Grade Fourth Grade Fifth Grade Sixth Grade Seventh Grade Eighth Grade Ninth Grade Tenth Grade Eleventh Grade Twelfth Grade	Record the grade levels represented by child participants in this study. Each Grade has its own column, mark a “1” in any column with the grade represented in the study. This refers specifically to the grade level that students were in at the very start of the study. For example, if a study collects CBM data on first grade students and then follows those students through second and third grade, you only mark a 1 in the first grade column. <ul style="list-style-type: none"> <li>Not reported = No information on grade level was reported</li> </ul>

	Grade Notes	Anecdotal	Make any notes about grade level that are important; for example, if students were followed longitudinally over 3 years or if grade level information was unclear.
	Child with or at-risk of a Disability Reported	<p>Select <b>one</b>:</p> <p>0 = not reported</p> <p>1 = no children with disabilities or at-risk</p> <p>2 = yes, children with <b>disabilities</b> are <i>included</i></p> <p>3 = yes, children with <b>risk</b> for disabilities are included</p> <p>4 = yes, <b>both</b> children with and at-risk for disabilities are included</p>	<p>Note. This code refers to with a disability (including but not limited to): specific learning disability including a reading disability (dyslexia), math disability (dyscalculia) or a writing disability (dysgraphia), autism spectrum disorders (ASD), developmental delay, cognitive or intellectual disability, speech language impairment, emotional behavior disability or disorder, blindness or visual impairment, Deaf or hard of hearing, Deaf-blindness, ADHD, Other health impairment; orthopedic impairment, multiple disabilities, traumatic brain injury (TBI).</p> <p>Also note that older studies may use terms that are outdated and non-US studies may use other terms. For example, “mild mental handicap” or “mental retardation” may appear in the literature. This is a disability.</p> <ul style="list-style-type: none"> <li>● Not reported = no information related to child disability or risk status was reported</li> <li>● No = information about disability was reported but authors stated that no children with disabilities were included in the sample</li> <li>● Yes = the authors provided at least some information about the <b>disability</b> of child participants (e.g., sample size of children with developmental delay, statement that “children with disabilities were included.”)</li> <li>● Yes = the authors provided at least some information about the <b>risk</b> status of child participants (e.g., statement that “children at-risk for disabilities were included.”)</li> <li>● Yes, the authors provided at least some information about the <b>disability and risk</b> status of child participants.</li> </ul>

	Child Disability or Risk Information	Copy/Paste or N/A	Use N/A for studies that received a code of “no, information related to child disability or risk status was reported.” <ul style="list-style-type: none"> <li>• Copy and paste the specific information related to the type of disability or risk children in the study had as well as sample sizes; and copy and paste information related to a study reporting that children with disabilities were excluded from the study.</li> </ul>
	Setting	Select <b>one</b> : 0 = not reported 1 = general education 2 = special education 3 = intervention 4 = Mix	This code refers to the type of setting in which students were in specific to the purpose of the data collection setting: Not reported = the authors did not specify if the study was specific to general education, special education, intervention, or a mix. <ul style="list-style-type: none"> <li>• General education = any general education classroom</li> <li>• Special education = any level of special education setting, including resource room, self contained, etc.</li> <li>• Intervention = the study may include students with disabilities or students without disabilities but the CBM data were collected in intervention settings</li> <li>• Mix = CBM data were collected in more than one setting</li> </ul>
<p><b>NOTE:</b> For the next set of codes that require you to report sample sizes for demographics, sometimes authors provide the raw data (sample size such as the total number of males), and sometimes a percent will be reported (e.g., 54% female); sometimes both will be reported.</p> <ul style="list-style-type: none"> <li>• <b>Provide the information only as it is provided in the study (i.e., if only % are provided, then only record percent information and use NR for cells that ask for a total).</b></li> </ul> <p>The only thing that we do not need is if authors provide information on a broader scale, such as for the entire school or district in which students attended. <b>We can only use information about the sample.</b></p>			
	N of Females	Number or NR	<ul style="list-style-type: none"> <li>• Provide the raw number of child female participants or NR when this information is not reported; use numerals.</li> </ul>
	N of Males	Number or NR	<ul style="list-style-type: none"> <li>• Provide the raw number of child male participants or NR when this information is not reported; use numerals.</li> </ul>
	Female %	Percent or NR	<ul style="list-style-type: none"> <li>• Provide the percent of child female participants or NR when this information is not reported; use <i>decimals</i> but do not use a % sign (e.g., 89% = 0.89)</li> </ul>

	Male %	Percent or NR	<ul style="list-style-type: none"> <li>● Provide the percent of child male participants or NR when this information is not reported; use <i>decimals</i> but do not use a % sign (e.g., 89% = 0.89)</li> </ul>
	Child <i>N</i> with or at-risk for Disability	Number or NR	<ul style="list-style-type: none"> <li>● Provide the raw number of child participants who were identified as having or being at risk for a disability.</li> <li>● Use NR if this information is not reported.</li> </ul>
	Child % with or at-risk for Disability	Percent or NR	<ul style="list-style-type: none"> <li>● Provide the percent of child participants who were identified as having or being at risk for a disability</li> </ul>
	Disability or Risk Type	Anecdotal or NR	<p>Provide a qualitative and quantitative summary of the disability and risk, including category labels and raw samples sizes or percentages. Make a note when authors do not provide sample sizes. Examples include:</p> <ul style="list-style-type: none"> <li>● Of the 100 children in the study, 10 had an identified disability (no information on disability type was provided).</li> <li>● In total, 30 children had disabilities including: developmental delay (80%), autism (15%), speech language impairment (5%).</li> <li>● Of the 100 children in the study, approximately 25% had or were at-risk for disabilities including: autism, intellectual disability, visual impairment, and other health impairment (sample sizes for each type were not provided).</li> <li>● Use NR if this information is not reported.</li> </ul>
<p><b>NOTE:</b> The following section on Race and Ethnicity, SES, and Dual Language Learner is only for studies conducted in the U.S., as these categories only reflect how students are categorized in the U.S. <b><u>For any non-U.S. study, you use the code NUS</u></b> and move to the next section.</p> <p>For all codes below:</p> <ul style="list-style-type: none"> <li>● NR = Not Reported</li> <li>● NUS = Non-U.S. Study</li> </ul>			
<b>U.S. Studies: Race and/or Ethnicity</b>			
	Child <i>N</i> Caucasian or White	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of children identified as White or Caucasian</li> </ul>
	Child <i>N</i> African American/Black	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of children identified as African American or Black</li> </ul>
	Child <i>N</i> Asian American	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of children identified as Asian American</li> </ul>

	Child <i>N</i> Hispanic	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of children identified as Hispanic</li> </ul>
	Child <i>N</i> Native Hawaiian or Pacific Islander (if not included in Asian American)	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of children identified as Native Hawaiian or Pacific Islander</li> </ul>
	Child <i>N</i> Native American/ American Indian	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of children identified as American or American Indian</li> </ul>
	Child <i>N</i> Multi-racial or More than two races	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of children identified as Multi-racial or More than two races</li> </ul>
	Child <i>N</i> Other	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of children identified as Other</li> </ul>
	% Caucasian or White	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of children identified as White or Caucasian; use <b><i>decimals</i></b> but do not use a % sign (e.g., 89% = 0.89)</li> </ul>
	% African American/Black	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of children identified as African American or Black; use <b><i>decimals</i></b> but do not use a % sign (e.g., 89% = 0.89)</li> </ul>
	% Asian American	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of children identified as Asian American; use <b><i>decimals</i></b> but do not use a % sign (e.g., 89% = 0.89)</li> </ul>
	% Hispanic	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of children identified as Hispanic; use <b><i>decimals</i></b> but do not use a % sign (e.g., 89% = 0.89)</li> </ul>
	% Native Hawaiian or Pacific Islander (if not included in Asian)	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of children identified as Native Hawaiian or Pacific Islander; use <b><i>decimals</i></b> but do not use a % sign (e.g., 89% = 0.89)</li> </ul>
	% Native American/ American Indian	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of children identified as American or American Indian; use <b><i>decimals</i></b> but do not use a % sign (e.g., 89% = 0.89)</li> </ul>
	% Multi-racial or More than two races	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of children identified as Multi-racial or More than two races; use <b><i>decimals</i></b> but do not use a % sign (e.g., 89% = 0.89)</li> </ul>
	% Other	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of children identified as Other; use <b><i>decimals</i></b> but do not use a % sign (e.g., 89% = 0.89)</li> </ul>

**NOTE:** The following section on socio-economic status is for studies conducted in the U.S. as these categories only reflect how students are categorized in the U.S. For any non-U.S. study, you will use the code NUS in each cell and move to the next section.

- FRL = free or reduced price lunch
- Head Start = the number of children who qualified for head start
- Poverty level = the number of children who qualified as low income for being a certain percent below the poverty line (this % changes with the year of the study so any indication of “under the poverty line” works here)

**U.S. Studies: Socioeconomic Status**

	<i>N</i> of FRL	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of child participants who qualified for FRL</li> </ul>
	<i>N</i> of Head Start	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of child participants who qualified for Head Start</li> </ul>
	<i>N</i> of < Poverty Line	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of child participants who qualified as being below the poverty line</li> </ul>
	% of FRL	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of child participants who qualified for FRL</li> </ul>
	% of Head Start	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of child participants who qualified for Head Start</li> </ul>
	% of < Poverty Line	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of child participants who qualified as being below the poverty line</li> </ul>
	U.S. Studies SES Other	Anecdotal or NR	<ul style="list-style-type: none"> <li>● If U.S. studies provide another format for describing the SES of participants, include that information and raw data or percentages here.</li> <li>● Use NR if not other information about SES is provided.</li> </ul>

**U.S. Studies: Dual Language Learner Status**

- For any non-U.S. study, use the code NUS and move to the next section.
- Dual language learner (DLL) includes all categorizations: English Learner (EL), English Language Learner (ELL), Multilingual Learner (ML), English as a Second Language (ESL), non-native speaker, Limited English Proficiency (LEP)

	Child <i>N</i> DLL	Number, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the raw number of child participants who were identified as a dual-language learner</li> </ul>
	Child % DLL	Percent, NR, or NUS	<ul style="list-style-type: none"> <li>● Provide the percent of child participants who were identified as a dual-language learner</li> </ul>

**Non-U.S. Studies:**

Note. The following section is for Non-U.S. studies only. In this section, you will capture qualitative and quantitative information as it is presented in the study. You may have to summarize information from the text as well as tables. Include % and sample size detail wherever you are able to.

- **If the study is a U.S. study, use the code US.**
- **If the stud is a Non-US study, but information is not reported use “NR”**

	Race/Ethnicity International Studies	Notes and sample sizes, or NR, or US.	Please use this column to make anecdotal notes about race/ethnicity if the study was a non-U.S. study. Provide all details that you are able to synthesis from text or tables. For example: <ul style="list-style-type: none"> <li>• “All students (n = 39) in the study were Chinese.”</li> <li>• “Students in the study were all born in Germany.”</li> <li>• “Most of the students in the study (95%) were born in Canada and (5%) were refugees from Somalia.”</li> </ul>
	Non-U.S. Studies SES Information	Anecdotal, or NR, or US.	For the Non-U.S. studies summarize the information that authors provide about SES in text or in the tables. Examples might include: <ul style="list-style-type: none"> <li>• “In our sample the highest prestige score in a household was on average M = 98.6 (SD = 34.4).”</li> <li>• “All of the included children were from middle to high income families.”</li> </ul>
	Non-U.S. studies dual language learners	Anecdotal, or NR, or US.	For the Non-U.S. studies summarize the information that authors provide about non-native speakers of the local or country official language, as it is provided in text or in the tables. Examples might include: <ul style="list-style-type: none"> <li>• “In our sample, approximately 10% of children were non-native German speakers.</li> <li>• 16 children were non-native Chinese speakers, other languages included English and French.</li> </ul>

**CBM-M Reliability: General Information and Reliability Reported**

Code all CBM mathematics. Note, each row in Excel has unique information. That means that if different grade levels are presented for the same measure, each grade should receive its own row in Excel.

Variable Name	Code Options	Code Descriptions
Study Identifier	Number	This number will be provided for all studies.
Authors	Names	All authors' last names, separated by commas
Year	Year	Year of publication
Measure Name	Anecdotal	Report the official measure name. This may be a title of a norm-referenced measure (e.g., easyCBM), or it may be an informal name for a researcher developed measure (e.g., number skills).
Measure Citation	Anecdotal or NR	Include the citation of the measure, if provided. If the measure was adapted from an existing measure include [adapted from: CITATION].
Content Area Note	Anecdotal	You must describe the content of the CBM Measure for example "computation with whole numbers" or "numeral identification" or "word problem solving."
Grade Level	Anecdotal	Many studies may give different information by grade level of the assessment. Use a new row in Excel for different information as necessary.
Number of Items	Number or NR	Report the number of items in the assessment; use not reported if it is not given. For measures that are scales, check the tables to determine if the items are presented.
Timed Administration	Select one: 0 = not reported 1 = measure was not timed (open ended) 2 = measure was timed	Select whether or not the CBM was timed.
What was the Administration Time	Number and Unit	Record the number of minutes (or seconds if less than a minute) for the administration format. Include the unit "min" or "s"

Reliability Type Reported	Use a code of 1 to indicate if the reliability is reported, and a code of 0 to indicate that it was not reported. No cell should be left blank.  internal consistency; internal reliability; Cronbach's alpha (IC)	This code refers to the type of reliability that is reported for each measure. Each reliability type has its own column in Excel, report the reliability estimates that are provided. Use symbols > < as necessary (e.g., reliability for split half was reported as greater than .90; use > .90 in Excel). Also use the terms M = for average; and "range" to specify. For example, test retest "range .80 to .85" or "M = .82." <ul style="list-style-type: none"> <li>● Internal consistency; internal reliability; Cronbach's alpha = the authors reported reliability across items within the measure</li> <li>● Test retest = the correlation between one test administration and another test administration of the same measure is provided</li> <li>● Parallel form = reliability between multiple (two or more) versions of the same test (sometimes called Form A, B) is provided</li> <li>● Split half = reliability of one half of the test compared to the other half of the test is provided</li> <li>● interrater agreement = reliability of scores across different raters is provided for the specific measure (if it is provided as an aggregate across all measures do not select this; See Item XX)</li> <li>● Other = note any other type of reliability information provided (e.g., generalizability and dependability studies)</li> </ul>
	Test Retest (TR)	
	Parallel Form (PF)	
	Split Half (SH)	
	Interrater agreement; Interscorer agreement	
	Other	
Reliability Notes	Anecdotal	Use a note to describe anything related to reliability that may not be captured well in the Excel file. For example, "reliability was established through multiple studies as > .90 for test retest and internal consistency."

**Criterion Validity: CBM Correlations with Criterion Measures**

<b>Variable Name</b>	<b>Code Options</b>	<b>Code Descriptions</b>
Authors	Names	All authors' last names, separated by commas
Year	Year	Year of publication
Correlation Descriptor	Anecdotal	Add a brief (3-4 word) description of the correlation that is unique compared to other correlations in this study. Use terms such as the CBM name, criterion name, and time of year for the CBM
Group Description	Anecdotal or NA	Provide information about the specific group this is related to if the authors split the presentation of correlations in ways other than grade level. For example, by district or school, or by students with disabilities compared to students without disabilities. Use NA if this does not apply.
CBM Measure Name	Record the specific name of the CBM	E.g., Aimsweb, easyCBM, researcher-developed, DIBELS
CBM Citation	Record the citation	Record any citation given for the measure
Content of the Measure	Anecdotal	Specify the skills measured. For example, for an M-COMP measure specify which operations were included (e.g., single digit addition, multi-digit subtraction).
Grade	Number	Report the specific grade level of the <b>CBM administration</b> that you are providing correlations or slope for.
CBM Administration Time of Year	Anecdotal	Report the specific time of administration (e.g., fall, winter, December, May) that you are reporting a correlation for. This is the CBM administration time. If more than one descriptor is given (e.g., winter January, then give both). If the study specifies that the measure was given at the beginning of the year, use Fall and if the study specifies that the measure was given at the end of the year, use Spring. It's really important if we have the time of year as a month that we record this to approximate the number of weeks between CBM and Criterion measure administration.
Criterion Measure	Name	Record the criterion measure that this correlation is associated with.

Criterion Measure Type	Select one: 0 = not reported 1 = state test 2 = other CBM 3 = norm-referenced math achievement measure 4 = researcher developed measure 5 = unclear 6 = other	Select the type of criterion measure that was used: <ul style="list-style-type: none"> <li>• Not reported = the authors stated that a criterion measure was used but did not provide any information about the measure to determine what type it was.</li> <li>• State test = any state end of year test</li> <li>• Other CBM = the authors used another CBM (e.g., correlations between MBSP and AimsWeb)</li> <li>• Norm-referenced math achievement measure = any known norm-referenced math achievement measure such as the SAT-10, TEMA, TOMA, WJ-Applied Problems, WJ Calculation, etc.</li> <li>• Researcher developed measure = any measure that is researcher developed and not norm-referenced</li> <li>• Unclear = this code is reserved for studies that use a measure that may be unclear because it's not a well-known norm-referenced measure (e.g., foreign studies) or you can't find any information about the measure</li> <li>• Other</li> </ul>
Criterion Measure Time of Year	Anecdotal (include time of year and grade)	Report the specific time of administration time of the criterion measure. Make sure to specify if this is more than one academic year of lag time. For example, if you report CBM administration time as fall for grade 2, but the criterion measure was administered in spring of grade 3, we need to know the grade level too.
Correlation	Decimal	Record the given correlation between the CBM and criterion measure. Include as many decimal places as given in the manuscript.
Notes	Anecdotal	Add any notes or challenges with coding due to how the study reported information.

### Diagnostic Accuracy

This may be referred to a ROC or AUC analysis, as well as classification accuracy. Please note that for diagnostic accuracy, authors may report cut scores, specificity, and sensitivity for multiple time points for the same measure. Each measure with the same percentile cutoff should be on the same line (and separately by grade when provided).

Variable Name	Code Options	Code Descriptions
Authors	Names	All authors' last names, separated by commas
Year	Year	Year of publication
Grade	Number	Report the specific grade level of the CBM that you are providing diagnostic accuracy information for.
CBM Measure and Details	Name (Details)	Specify which measure this is for, if it is computation specify the operations, if it is another measure be as specific as possible.
Criterion Measure	Name	Specify the measure that was used to determine correct classification of students.
Criterion Time of Year and Grade	List	Provide the time of year that the criterion measure was given and also if it was the same school year as the CBM measure, or a different year, indicating the difference in years. Examples: <ul style="list-style-type: none"> <li>• TEMA was given in the spring of the same year as the CBM</li> <li>• TEMA was given in the spring, 2 years after the CBM administration</li> </ul>
Percentile Cut Point	Percentile	Indicate what percentile the authors used for the analysis. Use whole numbers (e.g., 25 <sup>th</sup> percentile = use "25"). Also indicate if the cut point was "passing" or "proficient" on a test.
AUC or Classification Accuracy Reported	Select one: 0 = no, neither 1 = AUC 2 = Classification accuracy 3 = both AUC and classification accuracy	Record whether or not the study reported the AUC, classification accuracy, or both of those statistics.

All AUC information	Specific AUC or AUC Range and time of year label (code for all studies); <b>Use NR for studies that do not report AUC</b>	Capture the AUC as it is reported for each time of year (e.g., fall, winter, spring). Put all information in one cell, such as: Fall = .87 Winter = .90 Spring = .88  Some studies may not present time of year information; if that is the case you can simply report a range or a specific AUC
Classification Accuracy	Specific Classification accuracy or range of accuracy and time of year label; <b>Use NR for studies that do not report classification accuracy</b>	Capture the classification as it is reported for each time of year (e.g., fall, winter, spring). Put all information in one cell, such as: Fall range = .87 to .90 Winter range = .90 to .91 Spring range = .80 to .90
If AUC or classification accuracy are not reported, then you need to report the following as applicable (if either AUC or classification accuracy are reported, then we don't need any of the codes below):		
Positive Predictive Power Range	Range	Positive Predictive Power (PPP): refers to the proportion of students that scored at/ below the cut score on the CBM math assessment that actually scored at/below the specified percentile on the criterion measure.
Negative Predictive Power Range	Range	Negative Predictive Power (NPP) refers to the proportion of students that scored above the cut score on the CBM math assessment that actually scored above the specified percentile on the criterion measure.
Diagnostic Accuracy Other Results	Anecdotal or NA	Only use this column to report other diagnostic accuracy statistics for studies that do not report either AUC or PPP/NPP.  For example, positive likelihood ratios, sensitivity/specificity, false positive/negative, etc.

### Stage 3

Note, from Foegen et al. (2007), “[For Stage 3] we focused on those [studies] that specifically examined factors associated with teachers’ use of mathematics CBM and the relation between these practices and student achievement.”

Variable Name	Code Options	Code Descriptions
Study Identifier	Number	This number will be provided for all studies.
Authors	Names	All authors’ last names, separated by commas
Year	Year	Year of publication
Grade	Number	Report the specific grade level(s) in the study where information for Stage 3 is presented.
CBM Measure	Name	Specify which measure this is for.
Summary	Description	For all studies, provide a short description of how this study meets requirements for Stage 3 research. Such as a description of what authors investigated, how are student outcomes impacted by teacher use of CBM, etc.
Major Contrasts	Name	Provide a description of the contrast the authors are reporting on. For example, from Foegen et al. Study 1 <ul style="list-style-type: none"> <li>• CBM with dynamic goal</li> <li>• CBM with static goal</li> <li>• Comparison</li> </ul> Study 2 <ul style="list-style-type: none"> <li>• CBM</li> <li>• CBM plus skills analysis</li> <li>• Control</li> </ul> <b>Avoid using any acronyms; all of this information should go in the same cell in Excel. To enter to a new line in Excel use command + shift + enter (Mac).</b>
Primary Dependent Outcome for Stage 3	Names	What dependent measure(s) did authors administer to measure the effect of Stage 3? This will most likely be related to the measure used to calculate effects.

<b>Quantitative Findings</b>	Description and Effect Sizes	<p>Provide the effect size result, or other results (e.g., regression coefficients) and what the comparison is. For example:  Study 1:</p> <ul style="list-style-type: none"> <li>• CBM dynamic goal vs. Contrast = .52</li> <li>• CBM static goal vs. Contrast = .25</li> </ul> <p><b>Avoid using any acronyms; all of this information should go in the same cell in Excel. To enter to a new line in Excel use command + shift + enter (Mac).</b></p> <p><b>Also note, some studies will provide different effect size estimates for different populations of students. Record all effects. For example,</b>  Study 1</p> <ul style="list-style-type: none"> <li>• CBM dynamic goal vs. Contrast = .52 (ELL students)</li> <li>• CBM dynamic goal vs. Contrast = .25 (All students)</li> <li>• CBM dynamic goal vs. Contrast = .52 (Non-ELL students)</li> <li>• CBM static goal vs. Contrast = .45 (ELL students)</li> <li>• CBM static goal vs. Contrast = .42 (All students)</li> <li>• CBM static goal vs. Contrast = .52 (Non-ELL students)</li> </ul>
Effect Size Metric	Name or NA	Use NA if Effect Sizes were not reported for Stage 3; give name of metric such as d, g, Tau U, etc.
Qualitative Findings	Description or NA	Use this space to provide a description of any other qualitative findings related to Stage 3 that were not captured or reported as quantitative findings. Use NA if there are not any relevant qualitative findings.