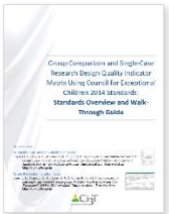
Group Comparison and Single-Case Research Design Quality Indicator Matrix Using Council for Exceptional Children 2014 Standards: **Standards Overview and Walk-Through Guide**

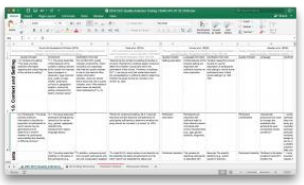
References:

To cite this overview and walk-through guide:



Royer, D. J., Lane, K. L., & Common, E. A. (2017). *Group comparison and single-case research design quality indicator matrix using Council for Exceptional Children 2014 standards: Standards overview and walk-through guide*. Unpublished tool. Retrieved from http://www.ci3t.org/pratice

To cite the quality indicator matrix:



Lane, K. L., Common, E. A., Royer, D. J., & Muller, K. (2014). *Group comparison and single-case research design quality indicator matrix using Council for Exceptional Children 2014 standards*. Unpublished tool. Retrieved from http://www.ci3t.org/practice

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Quality Indicator Standards Overview

The *Council for Exceptional Children Standards for Evidence-Based Practices in Special Education* (hereafter referred to as *Standards for EBP*; CEC, 2014) is a quality appraisal tool to support the categorization of evidence-based practices in special education (Wendt & Miller, 2012).

> The intent of identifying quality indicators essential for methodologically sound, trustworthy intervention studies in special education is not to prescribe all the desirable elements of an ideal study, but to enable special education researchers to determine which studies have the minimal methodological features to merit confidence in their findings. (CEC, 2014, p. 2)

Quality appraisal tools, such as the *Standards for EBP* are applied to studies examining an operationally-defined shared practice or program. The *Standards for EBP* includes eight quality indicators (QI): (a) context and setting, (b) participants, (c) intervention agent, (d) description of practice, (e) implementation fidelity, (f) internal validity, (g) outcome measures/dependent variables, and (h) data analysis. Included within the eight QIs are 28 components, with 24 pertaining to group design studies and 22 pertaining to single-case research design (SCRD) studies. Individual studies are coded against these components to quality appraise the methodological soundness of a study using an absolute or weighted coding scheme. With absolute QI coding, each QI receives either a 1 for present or 0 for absent, with present meaning all components within a particular QI were met (e.g., QIs 2.1 and 2.2 were met to indicate QI 2.0 was present) and absent meaning at least one component of the QI was not met. Whereas with weighted QI coding, "partial credit" is given to each QI if a subset of its components is present (e.g., QIs 2.1 was met and 2.2 was not met to indicate QI 2.0 was 50% met; see Lane, Kalberg, & Shepcaro, 2009 for addition information). Each study is deemed methodologically sound if all eight QIs (absolute coding) or 80% of all eight QIs are met (weighted coding). Next, methodologically sound studies are classified as having positive, neutral/mixed, or negative effects following the *Standards for EBP*.

The next step is to evaluate the entire body of evidence using *Standards for EBP* (CEC, 2014). An evidence-based classification is assigned according to the extent to which the body of evidence suggests the strategy, practice, or program meets criteria to be deemed an EBP – a highly rigorous standard when employing absolute coding. Classifications include: EBP, potentially EBP, mixed evidence, insufficient evidence, and negative effects. Refer to the *Standards for EBP* to learn about these distinctions, with attention to the type of methodology employed (group design and SCRD). Also see Wendt and Miller (2012) for an overview and preliminary comparison of different appraisal instruments.

Lane, Common, Royer, and Muller (2014) developed the "Group comparison and single-case research design quality indicator matrix" (available at ci3t.org) to support the coding and categorizing of the literature using the *Standards for EBP*. In addition to language from the *Standards for EBP*, clarifying sources were also

included (i.e., Cook et al., 2015; Gast & Ledford, 2014; Gersten et al., 2015; Kennedy, 2005; Kratochwill et al., 2010; Kratochwill et al., 2013; Lane, Bruhn, Crnobori & Sewell, 2009; Lane, Wolery, Reichow, & Rogers, 2007; Mongaue & Diez, 2009; O'Keefe et al., 2012; Sreckovic, Common, Knowles, & Lane, 2014; Tankersley, Cook, & Cook, 2008; Wong et al., 2013). This matrix allows for the scoring of both absolute and weighted coding criteria as described previously.

We encourage the interested reader to consider potential benefits of using the weighted coding criterion. For example, using weighted criteria coding it may be possible to avoid excluding studies of merit. Relatedly, it may reduce the likelihood of imposing too rigorous criteria that results in offering insufficient recommendations to inform practice (see article by Bryan Cook and colleagues in *Remedial and Special Education*, volume 36 issue 4, 2015). Namely, with too strict criteria, systematic reviews may indicate there are few to no EBPs for "what works" to teach a student to read, enjoy social interactions, increase engagement, and the like.

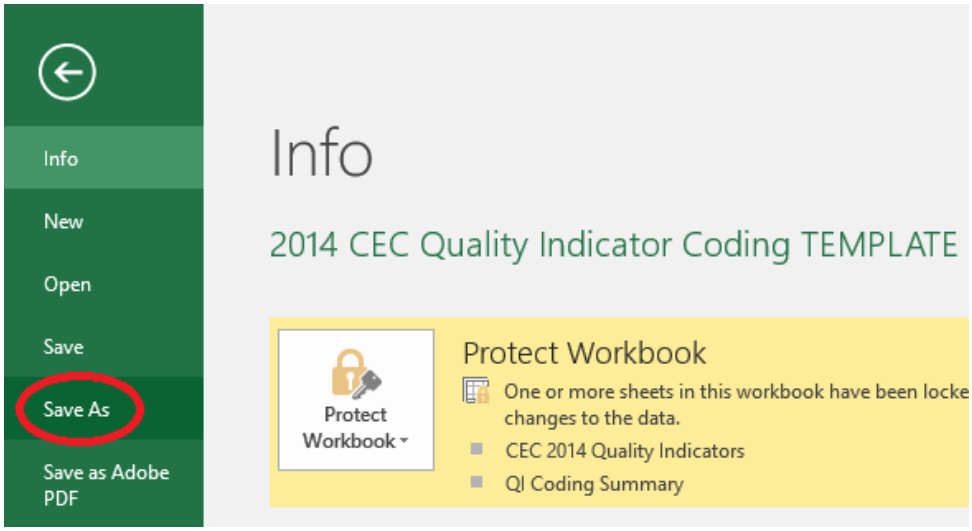
To illustrate, rather than evaluating only studies which met all QIs (absolute coding), Lane and colleagues proposed a modified approach in which studies meeting 80% or more of the QIs would be evaluated further (Lane, Bruhn, et al., 2009; Lane, Kalberg, et al., 2009). A weighted coding method allows each QI component met to contribute an equal proportion of "partial credit" or recognition for being addressed within each QI. A weighted coding method is advantageous in that it offers a more precise, detailed description of how much a QI is addressed in comparison to the more conservative met or not met approach to evaluate a QI in its entirety (Common, Lane, Pustejovsky, Johnson, & Johl, 2017). A weighted coding scheme may also be used as an alternative to absolute coding when evaluating a literature base spanning a period of time predating the introduction of core indicators such as treatment integrity (first introduced by Yeaton & Sechrest, 1981). This more liberal approach enables more studies to be included by offering partial credit in the evaluation process when answering the question: Is X (intervention) an evidence-based practice for Y (outcome variable) with P (participant descriptor) students (Lane & Kettler, 2019)?

In these materials, you will find resources to support QI coding and classifying the literature into an evidence-based category with the "Group comparison and single-case research design quality indicator matrix" (Lane, Common, Royer, & Muller, 2014). Below, you will find an instructional walk-through guide to support use of the MS-Excel template.

Group Comparison and Single-Case Research Design Quality Indicator Matrix Using Council for Exceptional Children 2014 Standards: Walk-Through Guide

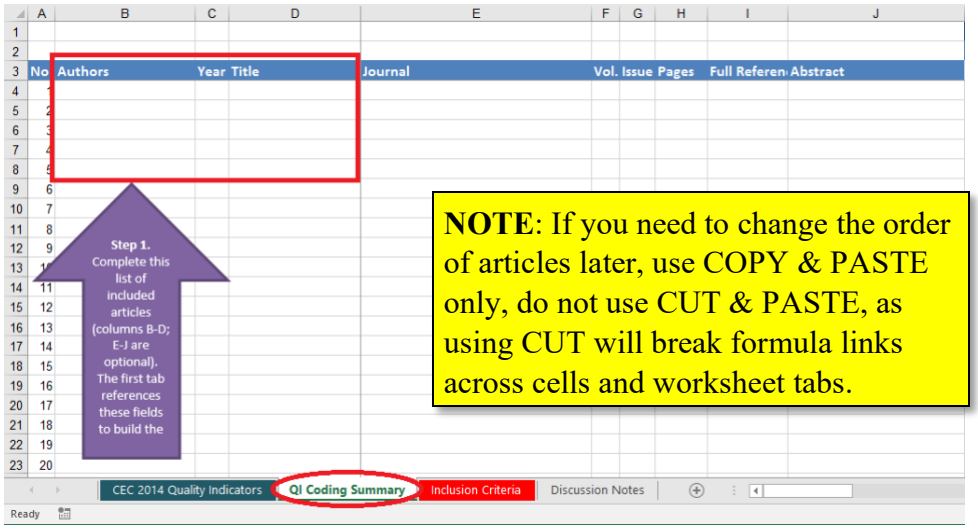
This walk-through guide illustrates how to use the quality indicator coding matrix created by Lane, Common, Royer, and Muller (2014). The matrix is for use in conjunction with procedures described in *Council for Exceptional Children Standards for Evidence-Based Practices in Special Education* (CEC, 2014) for evaluating the evidence base of an operationally defined practice or program on student outcomes.

Getting Started

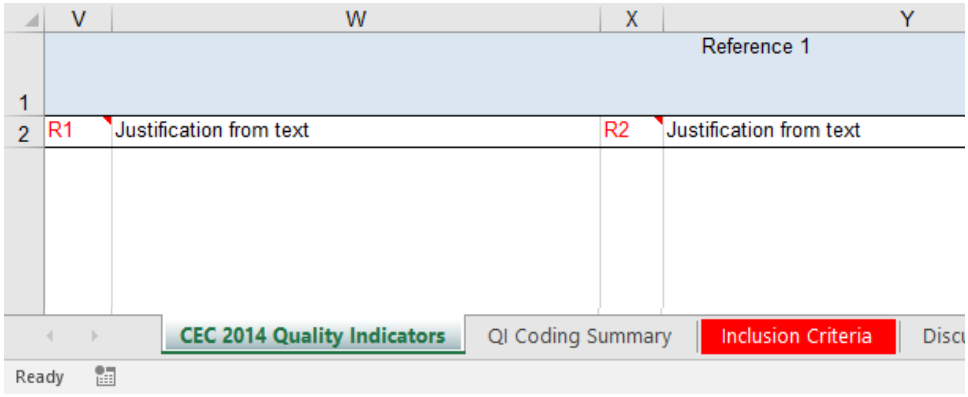


1. Open the MS-Excel file, *2014 CEC Quality Indicator Coding TEMPLATE.xlsx*.

2. Click FILE > SAVE AS and rename your file to include the start year and topic of your systematic literature review, followed by the current date. This will allow you to keep a history of files reflecting changes made by doing a SAVE AS each day you work in the file and moving old files to a PREVIOUS folder for safe keeping.
   Example: 2017 Precorrection QI Coding [date].xlsx



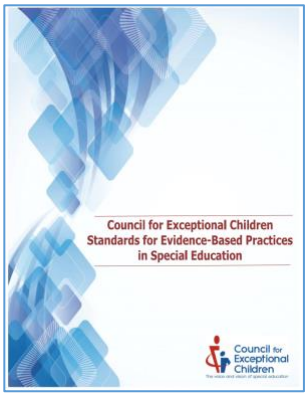
3. Start on the second tab titled *QI Coding Summary*. In columns B through J fill in information for the articles selected in your systematic literature review. Columns B-D are required (referenced in formulas in the first tab) and columns E-J are optional but helpful throughout the QI coding process.

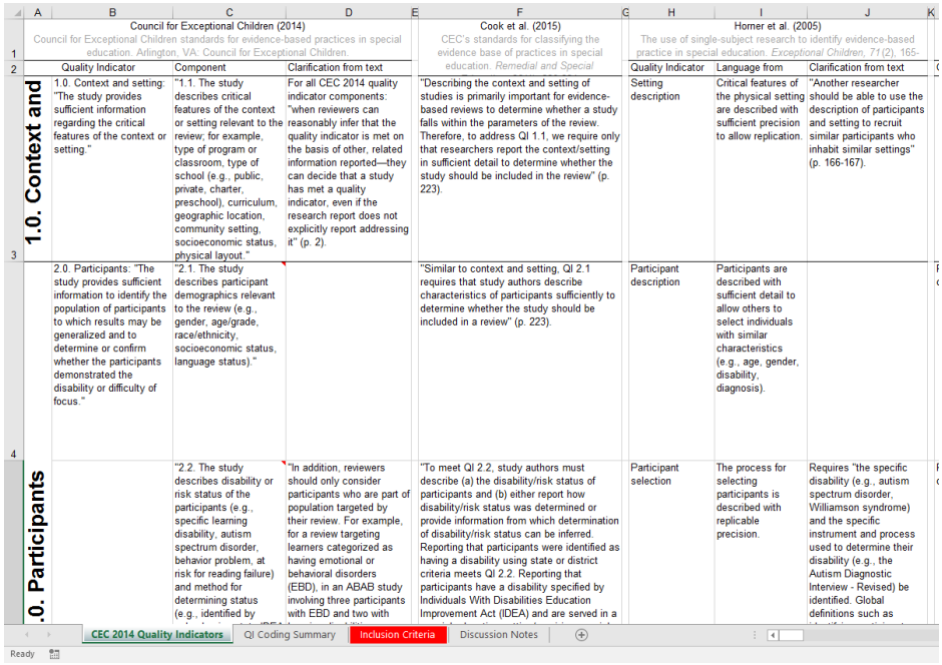


4. On the first tab titled *CEC 2014 Quality Indicators*, find cell V2 and replace "R1" with the initials of rater one, the primary coder for your review. Other cells in this tab and the second tab will automatically update with this new information.

5. In cell X2 replace "R2" with the initials of rater two, the secondary coder for your review. Having two raters provides a reliability check, and later this guide will show how interrater agreement is automatically calculated.

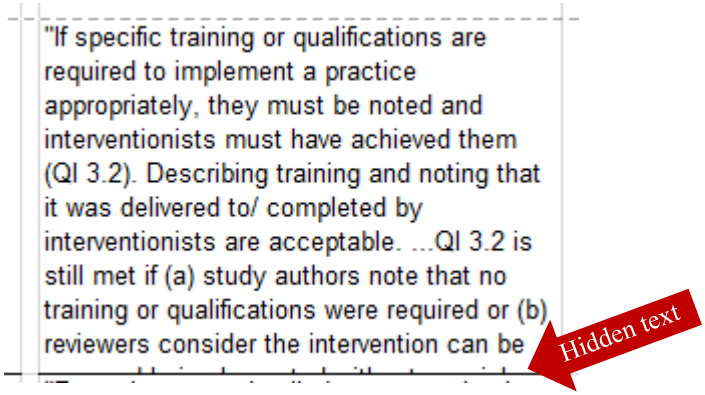
Become Familiar with the QI Coding Tab





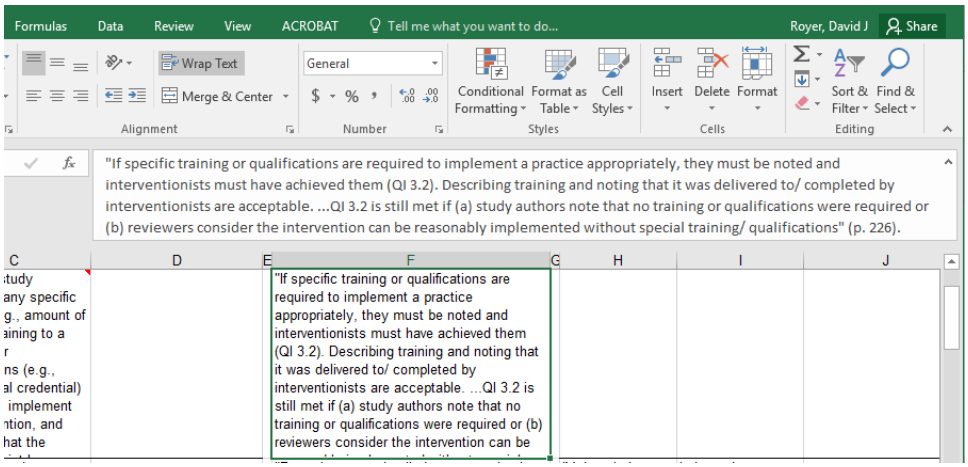
6. Remember the *Council for Exceptional Children 2014 Group Comparison and Single-Case Research Design Standards Quality Indicator Matrix* (CEC, 2014) should be considered your primary source for QI coding, as well as clarifications and examples found in Cook et al. (2015). The Excel matrix is simply an aide to support QI coding.

7. Familiarize yourself with the various resources in the first tab. The first five columns present CEC (2014) QIs, followed by a column for Cook et al. (2015) clarifications for each QI, as available and applicable. These are followed by Horner et al. (2005) and Gersten et al. (2005) QIs, with efforts made to align them to the updated 2014 QIs. Additional columns present parallel information from the What Works Clearinghouse (Kratochwill et al., 2010, 2013), Kennedy (2005), Gast & Ledford (2014), and more.

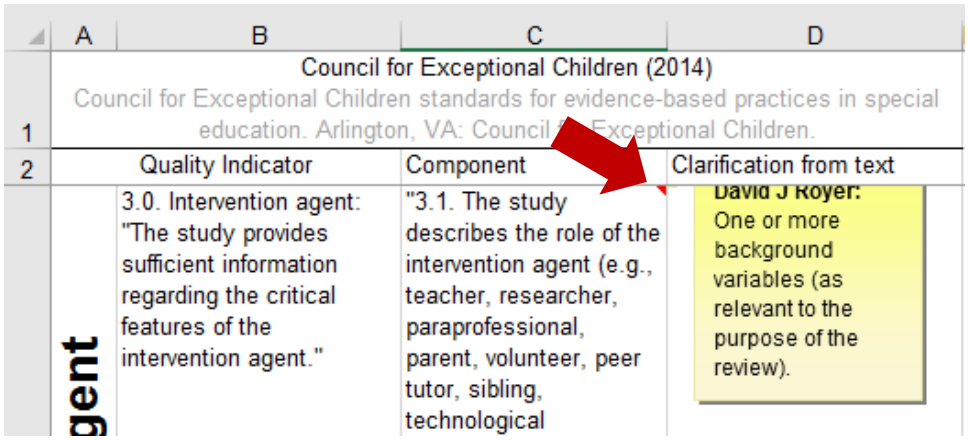


8. Depending on your version of Excel, zoom level of the tab, operating system (e.g., Mac OS, Windows, Linux), monitor size, etc. it is possible some text may not be visible. When this is the case, first try setting your zoom level to 100%.

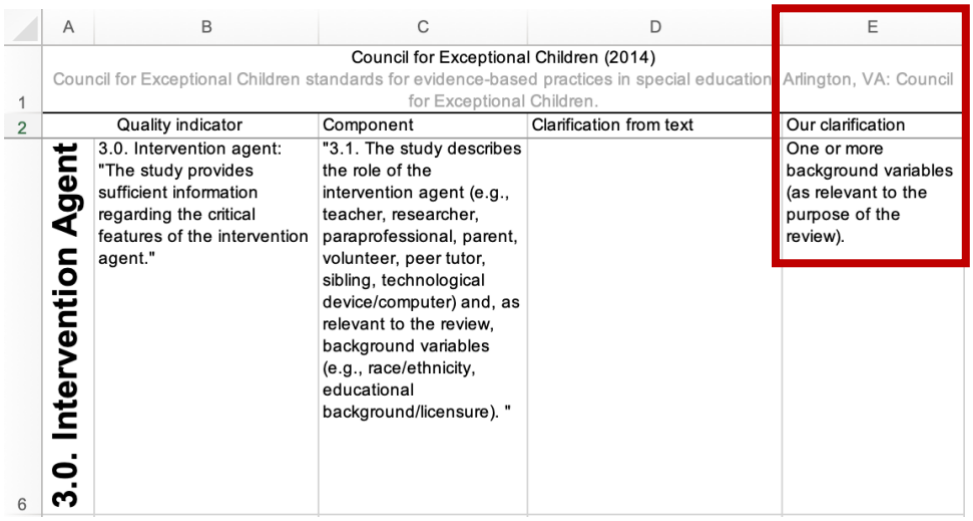
Next try reading the text in the formula bar at the top of the columns. You can make the formula bar larger to read all text by clicking its lower edge and dragging down.



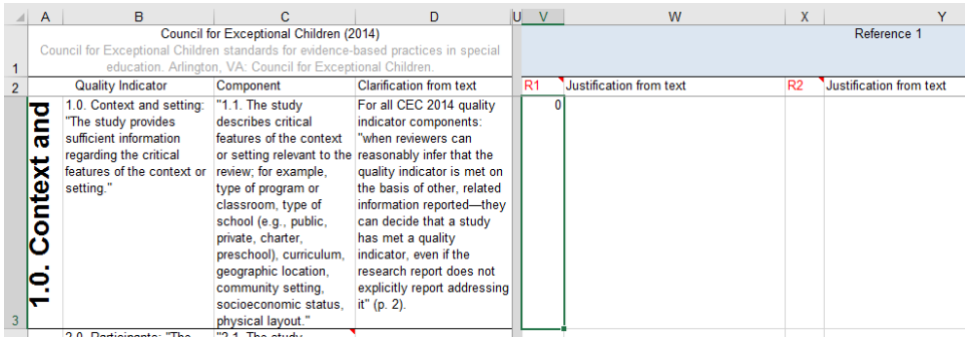
9. Some cells have comments (2014 .xlsx version), indicated by small red triangles in the upper right corner of the cell.

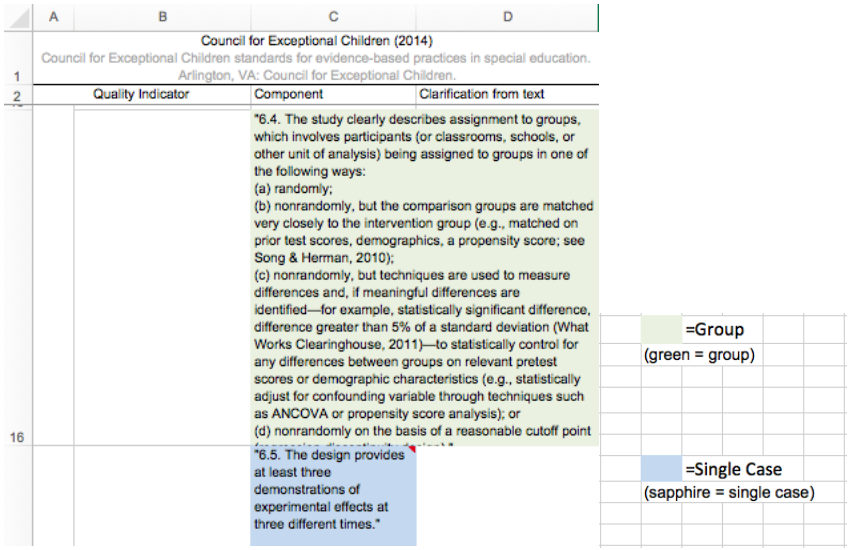


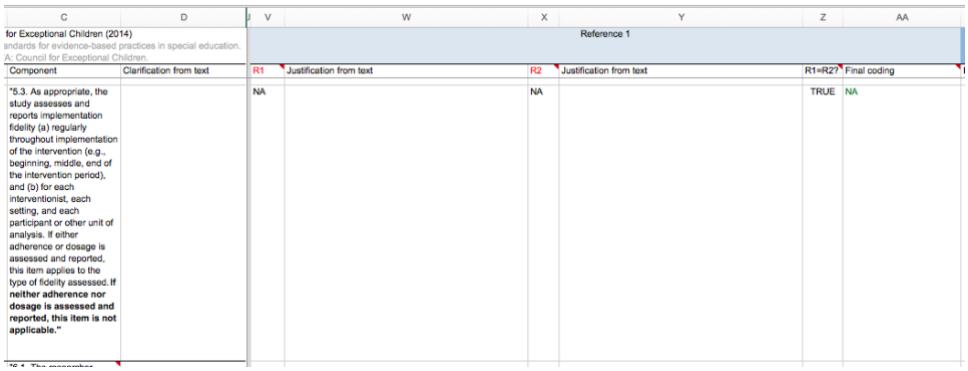
10. The 2019 .xlsx version update placed all comments in a column titled "Our clarification."

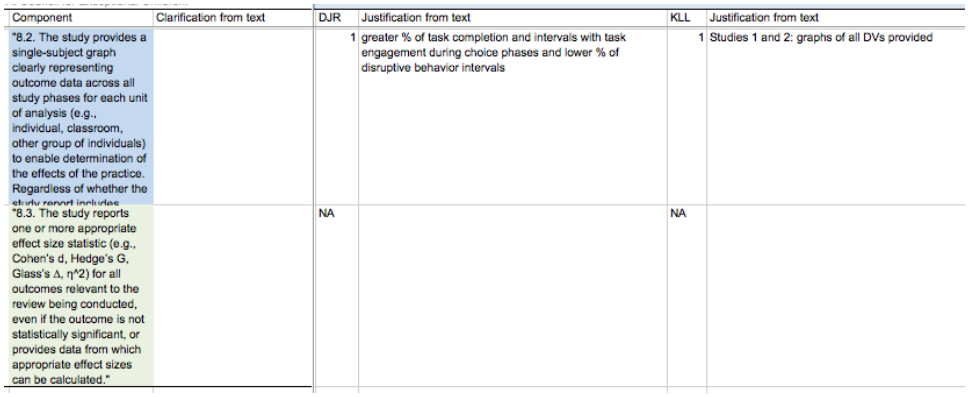


Quality Indicator Coding





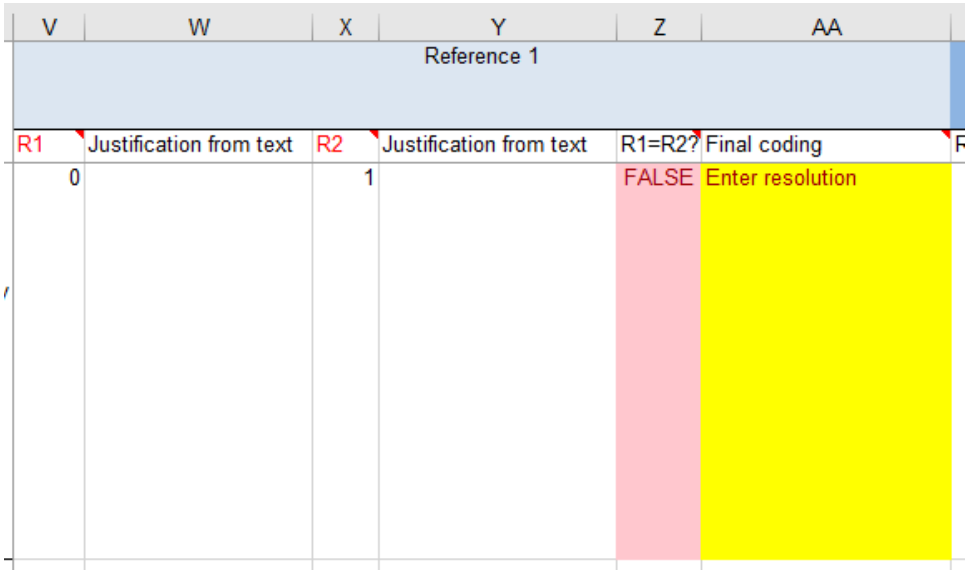




11. Begin entering your coding results for each QI component in column V for your first article. Each reference will automatically populate from where you entered information in the second tab earlier. Use a binary coding system where 0 = *QI component not met* and 1 = *QI component met*. The first rater will use the first two columns under each reference (e.g., V and W), adding comments and justification for each coding in the second column labeled JUSTIFICATION FROM TEXT. The second rater will use the next two columns (e.g., X and Y). Ideally the second rater will have his or her own file and will code each article independently, then copy codes and comments into the first rater's file.

12. *Note.* If a QI is not applicable, such as QI 5.3 when QI 5.1 and 5.2 are not met, enter **NA** (without a slash; not N/A). When the FINAL CODING column is NA, later formulas will automatically remove that QI from the weighted coding calculations.

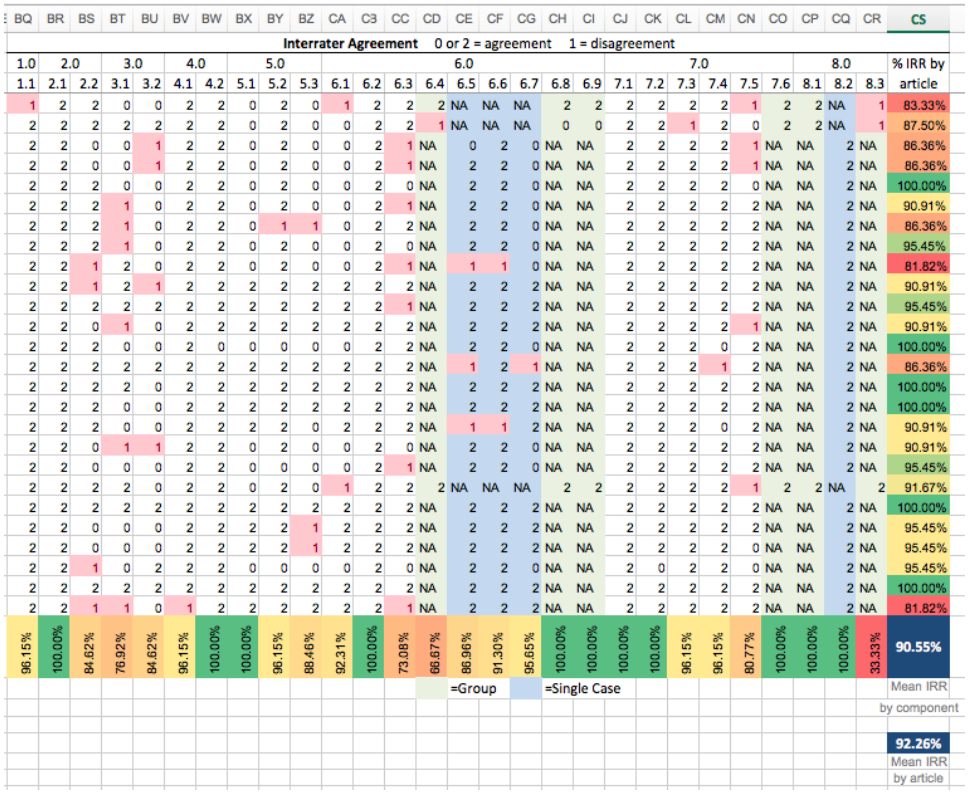
    Some QIs are applicable only to **g**roup design studies (**g**reen shaded cells in column C) and some only to **s**ingle-case design studies (**s**apphire blue shaded cells in column C). When coding group design studies, enter NA for single-case cells. When coding single-case studies, enter NA for group design study cells.



V	W	X	Y	Z	AA
	Reference 1				
R1	Justification from text	R2	Justification from text	R1=R2?	Final coding
0		1		FALSE	Enter resolution

13. After both raters' data are entered, the R1=R2? column will automatically populate with TRUE or FALSE to show agreement or disagreement between raters. If TRUE, the FINAL CODING column will automatically populate with the agreed coding. If FALSE, the FINAL CODING column will turn yellow to prompt raters to discuss the discrepancy and enter the resolved coding. **Do not adjust** either rater's original coding or the FALSE – leave them, they will be used later in formulas to calculate interrater agreement. The FINAL CODING column will be used in future steps.
14. Continue scoring and discussing discrepancies until all articles have a FINAL CODING in each row. Double check to ensure there are no blank cells in a FINAL CODING column.

Reporting Interrater Agreement



BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS
														Interrater Agreement			0 or 2 = agreement						1 = disagreement					
1.0		2.0		3.0		4.0		5.0						6.0								7.0				8.0		% IRR by
1.1	2.1	2.2	3.1	3.2	4.1	4.2	5.1	5.2	5.3	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.1	7.2	7.3	7.4	7.5	7.6	8.1	8.2	8.3	article
1	2	2	0	0	2	2	0	2	0	1	2	2	2	NA	NA	NA	2	2	2	2	2	2	1	2	2	NA	1	83.33%
2	2	2	2	2	2	2	0	2	0	0	2	2	1	NA	NA	NA	0	0	2	2	1	2	0	2	2	NA	1	87.50%
2	2	0	0	1	2	2	0	2	0	0	2	1	NA	0	2	0	NA	NA	2	2	2	2	1	NA	NA	2	NA	86.36%
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2	2	2	0	0	2	2	0	2	0	0	2	0	NA	2	2	0	NA	NA	2	2	2	2	0	NA	NA	2	NA	100.00%
2	2	2	1	0	2	2	0	2	0	0	2	1	NA	2	2	0	NA	NA	2	2	2	2	2	NA	NA	2	NA	90.91%
2	2	2	1	0	2	2	0	1	1	0	2	2	NA	2	2	0	NA	NA	2	2	2	2	2	NA	NA	2	NA	86.36%
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2	2	1	2	0	2	2	0	2	0	0	2	1	NA	1	1	0	NA	NA	2	2	2	2	2	NA	NA	2	NA	81.82%
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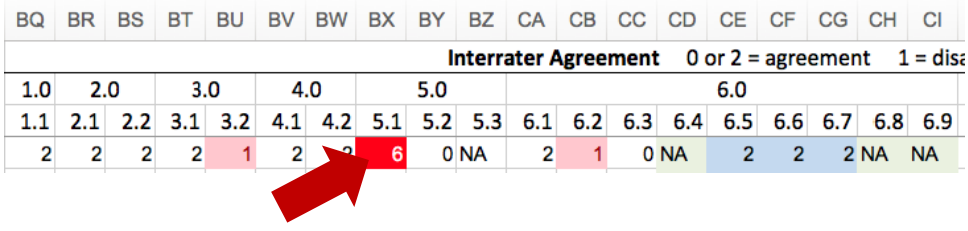
96.15%	100.00%	84.62%	76.92%	84.62%	96.15%	100.00%	100.00%	96.15%	88.46%	92.31%	100.00%	73.08%	66.67%	86.96%	91.30%	95.65%	100.00%	100.00%	100.00%	100.00%	96.15%	96.15%	80.77%	100.00%	100.00%	100.00%	33.33%	90.55%
														=Group			=Single Case											Mean IRR by component
																												92.26% Mean IRR by article

Note. Column CS and row 56 (percentages of interrater reliability) automatically color code highest percentages as green to lowest scores as red. This is only to draw attention to your successes (high percentages of agreement) and to indicate any low scores that might need discussion or explanation in your manuscript. There are no cut scores where colors change, it is a conditional formatting feature in Excel that uses whatever range of scores are available.



BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI
									Interrater Agreement			0 or 2 = agreement					1 = disa	
1.0		2.0		3.0		4.0		5.0				6.0						
1.1	2.1	2.2	3.1	3.2	4.1	4.2	5.1	5.2	5.3	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
2	2	2	2	1	2	2	6	0	NA	2	1	0	NA	2	2	2	NA	NA

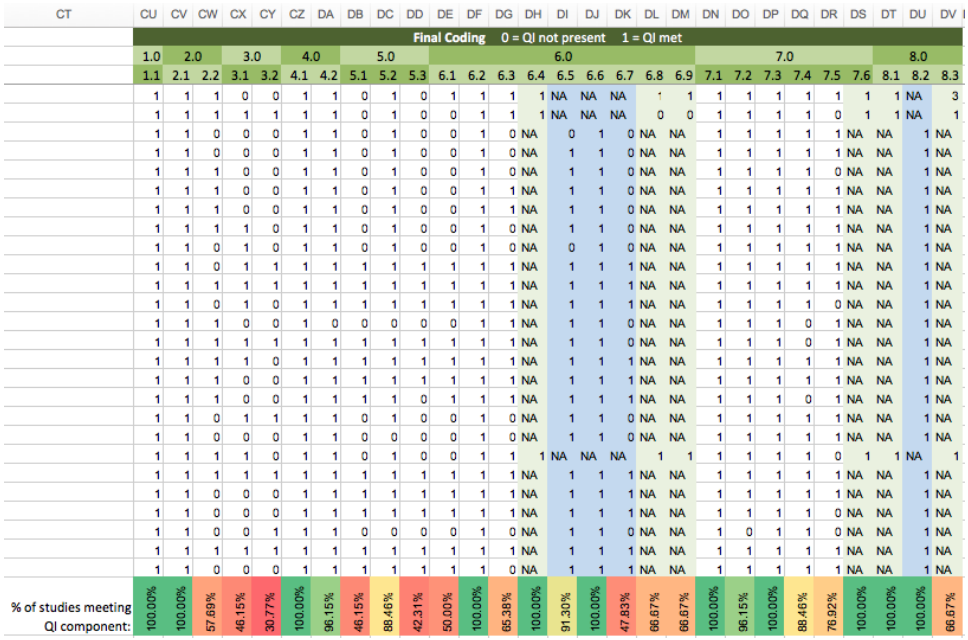
15. On the QI CODING SUMMARY tab, scroll to the right past each rater's codings to column BQ. (Formulas in columns K-BO automatically pull each rater's coding from the first tab for use in calculations and formulas on the QI CODING SUMMARY tab.) Columns K-BO sum codings from the two raters, so 0 (0+0) and 2 (1+1) indicate agreement, while 1 (0+1 or 1+0) indicates disagreement and will be highlighted light red with red text.

    Column CS reports percentage of interrater reliability (IRR; also referred to as interrater agreement; IRA) by article (each row). Row 74 reports percentage of interrater reliability by QI (each column). Scroll down past empty rows to get to row 74, there are many rows to accommodate large reviews. Cells coded NA are not included in calculations.

    Cell CS74 reports mean IRR by component, and cell CS78 reports mean IRR by article. These two cells are shaded blue with bold white text.

16. *Note.* A cell will turn red in the interrater agreement table if a QI code is out of range (i.e., not 0, 1, or NA). For each red cell, note the article and QI, then go back to the first tab (*CEC 2014 Quality Indicators*) and trouble shoot the FINAL CODING column and determine if it should be 0, 1, or NA.

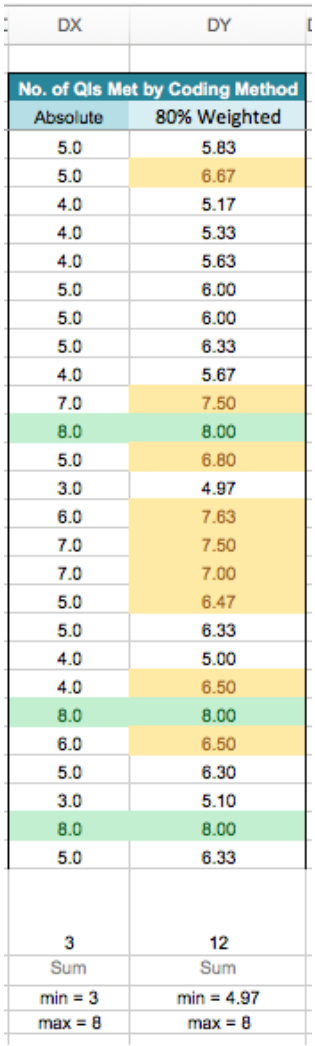
Final Quality Indicator Coding



CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV
	Final Coding 0 = QI not present 1 = QI met																											
	1.0	2.0		3.0		4.0		5.0			6.0									7.0						8.0		
	1.1	2.1	2.2	3.1	3.2	4.1	4.2	5.1	5.2	5.3	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.1	7.2	7.3	7.4	7.5	7.6	8.1	8.2	8.3
	1	1	1	0	0	1	1	0	1	0	1	1	1	1	NA	NA	NA	1	1	1	1	1	1	1	1	1	NA	3
	1	1	1	1	1	1	1	0	1	0	0	1	1	1	NA	NA	NA	0	0	1	1	1	1	0	1	1	NA	1
	1	1	0	0	0	1	1	0	1	0	0	1	0	NA	0	1	0	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	0	0	0	1	1	0	1	0	0	1	0	NA	1	1	0	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	1	0	0	1	1	0	1	0	0	1	0	NA	1	1	0	NA	NA	1	1	1	1	0	NA	NA	1	NA
	1	1	1	0	0	1	1	0	1	0	0	1	1	NA	1	1	0	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	1	0	0	1	1	0	1	0	0	1	1	NA	1	1	0	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	1	1	0	1	1	0	1	0	0	1	0	NA	1	1	0	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	0	1	0	1	1	0	1	0	0	1	0	NA	0	1	0	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	0	1	1	1	1	1	1	1	1	1	1	NA	1	1	1	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	1	1	1	1	1	1	1	1	1	1	1	NA	1	1	1	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	0	1	0	1	1	1	1	1	1	1	1	NA	1	1	1	NA	NA	1	1	1	1	0	NA	NA	1	NA
	1	1	1	0	0	1	0	0	0	0	0	1	1	NA	1	1	0	NA	NA	1	1	1	0	1	NA	NA	1	NA
	1	1	1	1	1	1	1	1	1	1	1	1	1	NA	1	1	0	NA	NA	1	1	1	0	1	NA	NA	1	NA
	1	1	1	1	0	1	1	1	1	1	1	1	1	NA	1	1	1	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	1	0	0	1	1	1	1	1	1	1	1	NA	1	1	1	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	1	0	0	1	1	1	1	0	1	1	1	NA	1	1	1	NA	NA	1	1	1	0	1	NA	NA	1	NA
	1	1	0	1	1	1	1	0	1	0	0	1	0	NA	1	1	0	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	0	0	0	1	1	0	0	0	0	1	0	NA	1	1	0	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	1	1	0	1	1	0	1	0	0	1	1	1	NA	NA	NA	1	1	1	1	1	1	0	1	1	NA	1
	1	1	1	1	1	1	1	1	1	1	1	1	1	NA	1	1	1	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	0	0	0	1	1	1	1	1	1	1	1	NA	1	1	1	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	0	0	0	1	1	1	1	1	1	1	1	NA	1	1	1	NA	NA	1	1	1	1	0	NA	NA	1	NA
	1	1	0	0	1	1	1	0	0	0	0	1	0	NA	1	1	0	NA	NA	1	0	1	1	0	NA	NA	1	NA
	1	1	1	1	1	1	1	1	1	1	1	1	1	NA	1	1	1	NA	NA	1	1	1	1	1	NA	NA	1	NA
	1	1	0	0	0	1	1	1	1	0	1	1	0	NA	1	1	1	NA	NA	1	1	1	1	1	NA	NA	1	NA
% of studies meeting QI component:	100.00%	100.00%	57.69%	46.15%	30.77%	100.00%	96.15%	46.15%	88.46%	42.31%	50.00%	100.00%	65.38%	100.00%	91.30%	100.00%	47.83%	66.67%	66.67%	100.00%	96.15%	100.00%	88.46%	76.92%	100.00%	100.00%	100.00%	66.67%

17. The green table in columns CU-DV reports final QI codings for each article. Row 74 reports the percentage of studies meeting each QI (column), automatically color coded for the highest percentages (green) to lowest percentages (red). Cells coded as NA are not included in calculations.

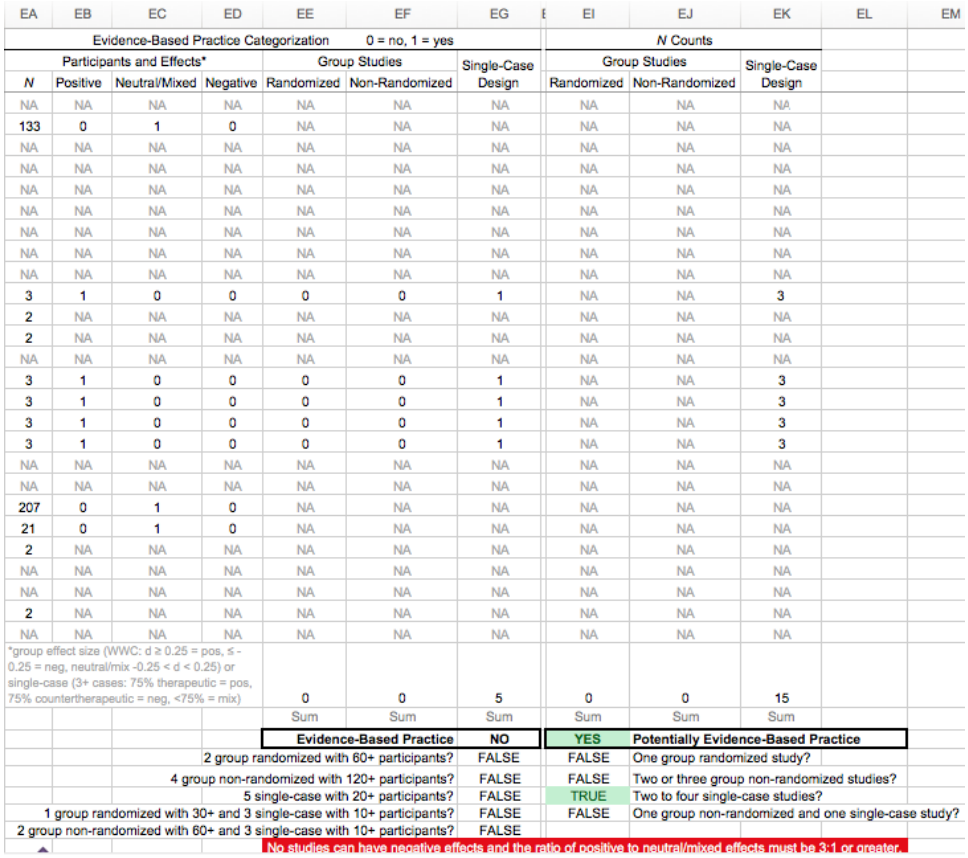
Evaluating the Evidence Base



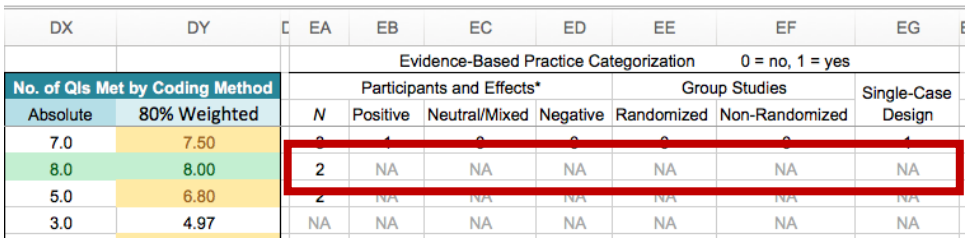
DX	DY
No. of QIs Met by Coding Method	
Absolute	80% Weighted
5.0	5.83
5.0	6.67
4.0	5.17
4.0	5.33
4.0	5.63
5.0	6.00
5.0	6.00
5.0	6.33
4.0	5.67
7.0	7.50
8.0	8.00
5.0	6.80
3.0	4.97
6.0	7.63
7.0	7.50
7.0	7.00
5.0	6.47
5.0	6.33
4.0	5.00
4.0	6.50
8.0	8.00
6.0	6.50
5.0	6.30
3.0	5.10
8.0	8.00
5.0	6.33
3	12
Sum	Sum
min = 3	min = 4.97
max = 8	max = 8

18. Columns DX and DY report the number of QIs met by two methods, absolute coding (criterion: all QI components met) and weighted coding (criterion: 80% of QI components; 6.4 out of 8.0 QIs; see Lane, Kalberg, & Shepcaro, 2009). Cells for an article meeting the absolute coding criterion will automatically turn green, while cells for an article meeting the 80% weighted coding criterion will turn yellow in column DY.

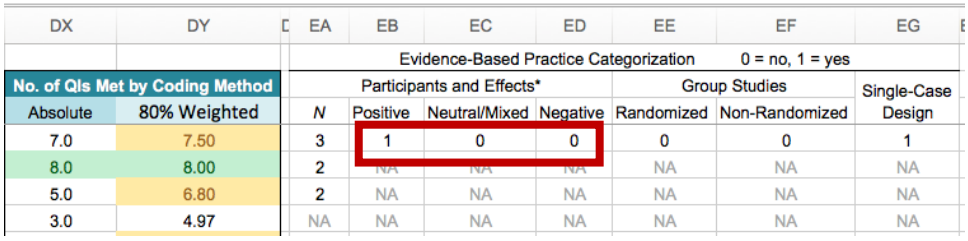
    Weighted coding assigns partial credit for an article that meets at least one QI component within a QI. For example, if an article described participant demographics (QI 2.1) but does not describe disability or risk status (QI 2.2), instead of receiving a score of zero for QI 2.0, it would receive a score of 0.5 for meeting QI 2.1, half of QI 2.0.



EA	EB	EC	ED	EE	EF	EG	EI	EJ	EK	EL	EM
Evidence-Based Practice Categorization 0 = no, 1 = yes							*N* Counts				
Participants and Effects*				Group Studies		Single-Case	Group Studies		Single-Case		
N	Positive	Neutral/Mixed	Negative	Randomized	Non-Randomized	Design	Randomized	Non-Randomized	Design		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
133	0	1	0	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
3	1	0	0	0	0	1	NA	NA	3		
2	NA	NA	NA	NA	NA	NA	NA	NA	NA		
2	NA	NA	NA	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
3	1	0	0	0	0	1	NA	NA	3		
3	1	0	0	0	0	1	NA	NA	3		
3	1	0	0	0	0	1	NA	NA	3		
3	1	0	0	0	0	1	NA	NA	3		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
207	0	1	0	NA	NA	NA	NA	NA	NA		
21	0	1	0	NA	NA	NA	NA	NA	NA		
2	NA	NA	NA	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
2	NA	NA	NA	NA	NA	NA	NA	NA	NA		
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
*group effect size (WWC: d ≥ 0.25 = pos, ≤ -0.25 = neg, neutral/mix -0.25 < d < 0.25) or single-case (3+ cases: 75% therapeutic = pos, 75% countertherapeutic = neg, <75% = mix)				0	0	5	0	0	15		
				Sum	Sum	Sum	Sum	Sum	Sum		
				Evidence-Based Practice		NO	YES	Potentially Evidence-Based Practice			
			2 group randomized with 60+ participants?			FALSE	FALSE	One group randomized study?			
			4 group non-randomized with 120+ participants?			FALSE	FALSE	Two or three group non-randomized studies?			
			5 single-case with 20+ participants?			FALSE	TRUE	Two to four single-case studies?			
		1 group randomized with 30+ and 3 single-case with 10+ participants?				FALSE	FALSE	One group non-randomized and one single-case study?			
		2 group non-randomized with 60+ and 3 single-case with 10+ participants?				FALSE					
				No studies can have negative effects and the ratio of positive to neutral/mixed effects must be 3:1 or greater.							



DX	DY	EA	EB	EC	ED	EE	EF	EG
		Evidence-Based Practice Categorization 0 = no, 1 = yes						
No. of QIs Met by Coding Method		Participants and Effects*				Group Studies		Single-Case
Absolute	80% Weighted	*N*	Positive	Neutral/Mixed	Negative	Randomized	Non-Randomized	Design
7.0	7.50	3	1	0	0	0	0	1
8.0	8.00	2	NA	NA	NA	NA	NA	NA
5.0	6.80	2	NA	NA	NA	NA	NA	NA
3.0	4.97	NA	NA	NA	NA	NA	NA	NA



DX	DY	EA	EB	EC	ED	EE	EF	EG
		Evidence-Based Practice Categorization 0 = no, 1 = yes						
No. of QIs Met by Coding Method		Participants and Effects*				Group Studies		Single-Case
Absolute	80% Weighted	*N*	Positive	Neutral/Mixed	Negative	Randomized	Non-Randomized	Design
7.0	7.50	3	1	0	0	0	0	1
8.0	8.00	2	NA	NA	NA	NA	NA	NA
5.0	6.80	2	NA	NA	NA	NA	NA	NA
3.0	4.97	NA	NA	NA	NA	NA	NA	NA

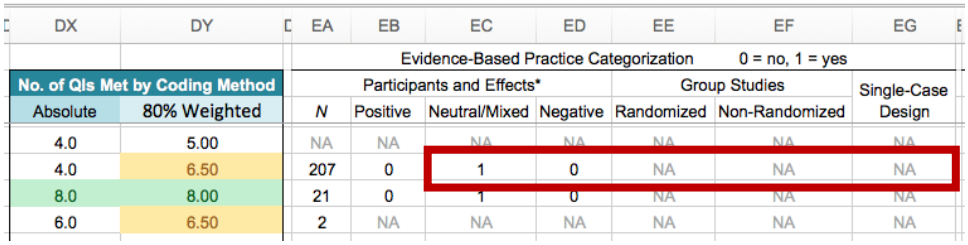
19. Columns EA through EK will help evaluate the evidence base for the operationally defined practice or program being reviewed. For studies not meeting at least 80% of QIs, columns EA through EK will automatically fill in with NA, as studies must be methodologically sound (by one method or the other) before they can be part of the evaluation of an evidence-based practice (EBP).

    For studies meeting at least 80% of QIs, columns EA through EK will remain blank, ready for more information. Start with column EA (labeled *N* at the top) and enter the number of participants/cases* applicable to the review.

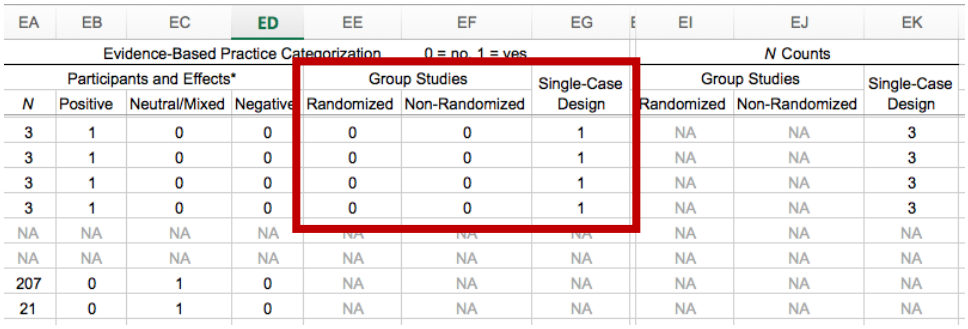
    If a study had less than three participants/cases, columns EB through EK will automatically fill in with NA as at least three participants/cases are necessary for further evaluation of the evidence base.

20. Next, for studies with three or more participants/cases, enter either 0 (*no*) or 1 (*yes*) for columns EB-ED to indicate if the study met CEC (2014) standards for having *positive, neutral/mixed,* or *negative* effects. For example, if a study had *positive* effects enter a 1 in column EB, and a 0 in columns EC and ED.

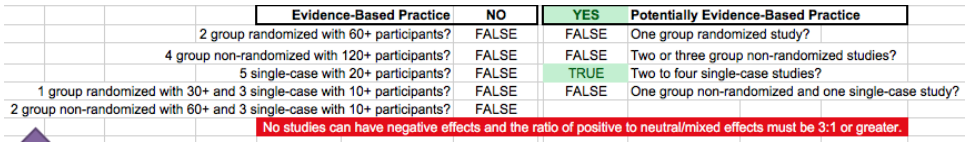
*In single-case research designs, "case" can refer to participant (e.g., individuals, small group, classroom, school), behavior, or setting (e.g., multiple baseline/probe across settings). Researchers may further operationalize "case" for alignment with research questions.



DX	DY	EA	EB	EC	ED	EE	EF	EG
		Evidence-Based Practice Categorization 0 = no, 1 = yes						
No. of QIs Met by Coding Method		Participants and Effects*				Group Studies		Single-Case Design
Absolute	80% Weighted	*N*	Positive	Neutral/Mixed	Negative	Randomized	Non-Randomized	
4.0	5.00	NA	NA	NA	NA	NA	NA	NA
4.0	6.50	207	0	1	0	NA	NA	NA
8.0	8.00	21	0	1	0	NA	NA	NA
6.0	6.50	2	NA	NA	NA	NA	NA	NA



EA	EB	EC	ED	EE	EF	EG	EI	EJ	EK
Evidence-Based Practice Categorization 0 = no, 1 = yes							*N* Counts		
Participants and Effects*				Group Studies		Single-Case Design	Group Studies		Single-Case Design
N	Positive	Neutral/Mixed	Negative	Randomized	Non-Randomized		Randomized	Non-Randomized	
3	1	0	0	0	0	1	NA	NA	3
3	1	0	0	0	0	1	NA	NA	3
3	1	0	0	0	0	1	NA	NA	3
3	1	0	0	0	0	1	NA	NA	3
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
207	0	1	0	NA	NA	NA	NA	NA	NA
21	0	1	0	NA	NA	NA	NA	NA	NA



Evidence-Based Practice	NO	YES	Potentially Evidence-Based Practice
2 group randomized with 60+ participants?	FALSE	FALSE	One group randomized study?
4 group non-randomized with 120+ participants?	FALSE	FALSE	Two or three group non-randomized studies?
5 single-case with 20+ participants?	FALSE	TRUE	Two to four single-case studies?
1 group randomized with 30+ and 3 single-case with 10+ participants?	FALSE	FALSE	One group non-randomized and one single-case study?
2 group non-randomized with 60+ and 3 single-case with 10+ participants?	FALSE		

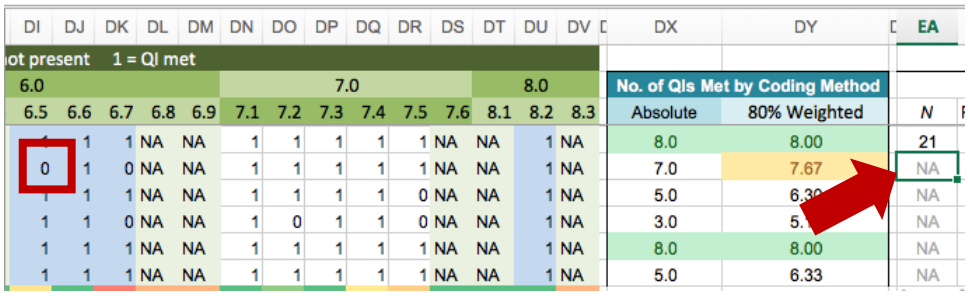
No studies can have negative effects and the ratio of positive to neutral/mixed effects must be 3:1 or greater.

If a study had either *neutral/mixed,* or *negative* results based on CEC (2014) standards, columns EE through EK will automatically fill in with NA, as *positive* results are needed for further evaluation of the evidence base.

21. Next, for studies with *positive* effects, enter a 0 (*no*) or 1 (*yes*) for columns EE through EG to indicate if the study was a randomized group design, non-randomized group design, or single-case design. Columns EI through EK are formulas and will automatically complete.

22. When columns EA through EK are completed for all studies, examine rows 76-82 below for the determination of evidence-based practice category. If any criterion for either the *evidence-based practice* or *potentially evidence-based practice* category is met, the corresponding cells well become green.

Note. Be cautious interpreting these results. Use of the Excel file is only a guide and can only calculate so many scenarios. Other data need to be considered with human judgement. For example, a practice may seem to be evidence based (cells turn green) because of multiple studies with *positive* effects and sufficient participants/cases, but if any study had *negative* effects or the ratio of *positive* to *neutral/mixed* studies is less than 3:1 then the practice cannot yet be considered evidence based.



DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DX	DY	EA
ot present		1 = QI met														
6.0					7.0						8.0			No. of QIs Met by Coding Method		
6.5	6.6	6.7	6.8	6.9	7.1	7.2	7.3	7.4	7.5	7.6	8.1	8.2	8.3	Absolute	80% Weighted	*N*
	1	1	NA	NA	1	1	1	1	1	NA	NA	1	NA	8.0	8.00	21
0	1	0	NA	NA	1	1	1	1	1	NA	NA	1	NA	7.0	7.67	NA
	1	1	NA	NA	1	1	1	1	0	NA	NA	1	NA	5.0	6.3	NA
1	1	0	NA	NA	1	0	1	1	0	NA	NA	1	NA	3.0	5.	NA
1	1	1	NA	NA	1	1	1	1	1	NA	NA	1	NA	8.0	8.00	NA
1	1	1	NA	NA	1	1	1	1	1	NA	NA	1	NA	5.0	6.33	NA

Also consider essential QIs. A study may meet 80% of QIs by the weighted coding method, but if a functional relation is not established between the independent variable and dependent variables (e.g., QI 6.5 = 0 for single-case designs), then that study should not be considered when evaluating the evidence base (i.e., enter NA in column EA for the *N* count of participants/cases, causing the remaining columns to fill in with NA).

References

Cook, B. G., Buysse, V., Klingner, J., Landrum, T. J., McWilliam, R. A., Tankersley, M., & Test, D. W. (2015). CEC's standards for classifying the evidence base of practices in special education. *Remedial and Special Education, 36*, 220-234. https://doi.org/10.1177/0741932514557271

Common, E. A., Lane, K. L., Pustejovsky, J. E., Johnson, A. H., & Johl, L. E. (2017). Functional assessment-based interventions for students with or at risk for high-incidence disabilities: Field-testing single-case synthesis methods. *Remedial and Special Education, 38*(6), 331-352. https://doi.org/10.1177/0741932517693320

Council for Exceptional Children. (2014). *CEC standards for evidence-based practices in special education*. Author.

Gast, D. L. & Ledford, J. R. (2014). *Single case research methodology: Applications in special education and behavioral sciences* (2nd ed.). Routledge.

Gersten, R., Fuchs, L. S., Compton, D., Coyne, M., Greenwood, C., & Innocenti, M. S. (2005). Quality indicators for group experimental and quasi-experimental research in special education. *Exceptional Children*, *71*, 149-164. https://doi.org/10.1177/001440290507100202

Horner, R. H., Carr, E. G., Halle, J., Mcgee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Exceptional Children*, *71*, 165-179. https://doi.org/10.1177/001440290507100203

Kennedy, C. H. (2005). *Single-case designs for educational research*. Pearson.

Kratochwill, T. R., Hitchcock, J. H., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2013). Single-case intervention research design standards. *Remedial and Special Education 34*, 26-38. https://doi.org/10.1177/074193251245279

Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M. & Shadish, W. R. (2010). *Single-case designs technical documentation*. Retrieved from What Works Clearinghouse website: http://ies.ed.gov/ncee/wwc/pdf/wwc_scd.pdf

Lane, K. L., Bruhn, A. L., Crnobori, M. L., & Sewell, A. L. (2009). Designing functional assessment-based intervention using a systematic approach: A promising practice for supporting challenging behavior. In T. E. Scruggs & M. A., Mastropieri (Eds.), *Advances in learning and behavioral disabilities: Policy and practice* (Vol. 22, pp. 341-370). Emerald.

Lane, K. L., Common, E. A., Royer, D. J., & Muller, K. (2014). *Group comparison and single-case research design quality indicator matrix using Council for Exceptional Children 2014 standards*. Unpublished tool. Retrieved from http://www.ci3t.org

Lane, K. L. & Kettler, R. J. (2019). Literature reviews, questions, and hypotheses. In R. J. Kettler (Ed.), *Research methodologies of school psychology: Critical skills* (pp. 24-41). Routledge. https://doi.org/10.4324/9781315724072

Lane, K. L., Wolery, M., Reichow, B., & Rogers, L. (2007). Describing baseline conditions: Suggestions for study reports. *Journal of Behavioral Education*, *16*, 224-234. https://doi.org/10.1007/s10864-006-9036-4

Montague, M., Bergeron, J., & Lago-Delello, E. (1997). Using prevention strategies in general education. *Focus On Exceptional Children, 29*(8), 1-12. https://doi.org/10.17161/foec.v29i8.6754

O'Keeffe, B. V., Slocum, T. A., Burlingame, C., Snyder, K., & Bundock, K. (2012). Comparing results of systematic reviews: Parallel reviews of research on repeated reading. *Education and Treatment of Children*, *35*, 333-366. https://doi.org/10.1353/etc.2012.0006

Sreckovic, M. A., Common, E. A., Knowles, M. M., & Lane, K. L. (2014). A review of self-regulated strategy development for writing for students with EBD. *Behavioral Disorders*, *39*, 56-77. https://doi.org/10.1177/019874291303900203

Tankersley, M., Cook, B. G., & Cook, L. (2008). A preliminary examination to identify the presence of quality indicators in single-subject research. *Education and Treatment of Children*, *31*, 523-548. https://doi.org/10.1353/etc.0.0027

Wendt, O., & Miller, B. (2012). Quality appraisal of single-subject experimental designs: An overview and comparison of different appraisal tools. *Education and Treatment of Children*, *35*, 235-268. https://doi.org/10.1353/etc.2012.0010

Wong, C., Odom, S. L., Hume, K. Cox, A. W., Fettig, A., Kucharczyk, S., Brock, M. E., Plavnick, J. B., Fleury, V. P., & Schultz, T. R. (2013). *Evidence-based practices for children, youth, and young adults with autism spectrum disorder.* Autism Evidence-Based Practice Review Group, Frank Porter Graham Child Development Institute, University of North Carolina at Chapel Hill.

Yeaton, W. H., & Sechrest, L. (1981). Critical dimensions in the choice and maintenance of successful treatments: Strength, integrity, and effectiveness. *Journal of Consulting and Clinical Psychology*, *49*, 156-167. https://doi.org/10.1037/0022-006X.49.2.156