More Power to You: Calculating Your Effect Size

Kelly Pelzel & Beth Troutman, University of Iowa
with assistance from
Allison Momany, University of Iowa
& John Paul Abner, Milligan College

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Overview

- What is effect size and how does it relate to statistical significance?
- Why calculate effect size with your own PCIT data?
- How do you handle data from families who drop out?
- Step-by-step instructions on how to calculate effect size (with example).
- Why interpret PCIT effect sizes with caution?
- Time to calculate your effect size (if you brought deidentified data).
• Effect size is an estimate of the magnitude of a difference

• It is used to convey the importance or strength of result.

• Whether or not a finding is statistically significant depends on both the effect size and the sample size.

• If you have an estimate of effect size, you can estimate how many participants you would likely need to get a statistically significant result. This is called a power analysis.
Effect Size Examples (Cohen’s $d$)

- Effect sizes are generally categorized as trivial ($d < .2$), small ($d = .2$ to .5), medium ($d = .5$ to .8), or large ($d > .8$) (Cohen, 1992).
- Even trivial effect sizes can have an impact at pop. level (e.g., baby aspirin).

- Baby Aspirin (Rosenthal et al., 1990) $d = 0.1$
- Stimulant Medication (Connor et al., 2002) $d = 0.9$
- PCIT (McNeil et al., 1999) $d = 2.7$
- PCIT (Burkley, 2016) $d = 0.7$
• Gardner’s Effect Size Illustrator:

http://esi.medicine.dal.ca/effect-size-illustrator.html#app=fb33&1a02-selectedIndex=0
GAME TIME: SEEING IS BELIEVING!

- 4 multiple choice items
- Illustration displayed represents the effect size of one of the three studies listed (ECBI intensity scores)
- Studies were included in the Thomas et al., 2016 meta-analysis
- Blue curve received PCIT
- Grading on the honor system
- Candy for winners!
a. Eyberg et al., 1995
   (-1.23)

b. McCabe et al., 2009
   (-0.67)

c. Mersky et al., 2016
   (-0.27)
a. Danko, 2015
(-0.25)

b. Webb et al., 2016
(-0.13)

c. Solomon et al., 2008
(-0.32)
a. Thomas & Zimmer-Gembeck, 2011 (-0.28)
b. Chaffin et al., 2004 (0.22)
c. Thomas & Zimmer-Gembeck, 2012 (-0.25)
- a. Bagnar et al., 2010 (-2.72)
- b. McNeil et al., 1999 (-2.65)
- c. Bagnar & Eyberg, 2007 (-1.43)
<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>PCIT</th>
<th>Control</th>
<th>SMD</th>
<th>Risk of Bias</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Total</td>
<td>Weight, % IV, Random, 95% CI</td>
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<tr>
<td>Abrahams et al, 2015</td>
<td>104.65</td>
<td>39.92</td>
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<td>26.22</td>
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<td>12</td>
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<td>Bagner et al, 2010</td>
<td>43.43</td>
<td>4.3</td>
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<td>Brestan et al, 1997</td>
<td>133.7</td>
<td>37.7</td>
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<td>13</td>
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<tr>
<td>Chaffin et al, 2004</td>
<td>57.148</td>
<td>3.0948</td>
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<td>35</td>
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<tr>
<td>Danko, 2015</td>
<td>117.7</td>
<td>27.86</td>
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<tr>
<td>Eyberg et al, 1995</td>
<td>120.4</td>
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<td>Foley, 2011</td>
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<td>Matos et al, 2009</td>
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<tr>
<td>McCabe et al, 2009</td>
<td>89.5915</td>
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<tr>
<td>McNeil et al, 1999</td>
<td>105.5</td>
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<tr>
<td>Mersky et al, 2016</td>
<td>123.8483</td>
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<td>Nixon et al, 2003</td>
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<td>Querido, 2004</td>
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<td>Stokes, 2015</td>
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<td>Terao, 1999</td>
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<td>Webb et al, 2016</td>
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</table>

Total (95% CI): 647 | 497 | 100.0 | -0.87 (-1.17 to -0.58) |
Why Calculate Effect Size?

• Compare your effectiveness to the benchmark.

• Compare the effectiveness of a modification to the effectiveness of the standard approach.

• Compare effectiveness with a specific population.
What about the Non-Completers?

How do you handle data from families who drop out?

- Leave them out
- Include them ("intent to treat with last observation carried forward")
- Include some of them (e.g., everyone who had at least two sessions, everyone who had at least two ECBIs, everyone who at least made it through CDI)
One sample, all given same outcome measure pre/”post” treatment
(in MS Excel put pre-tx score in Column A and post-tx score in Column B)

1. To calculate effect size, you will need the following (example in parenthesis below is for using MS Excel if you were calculating effect size for 10 patients):

   a. Pre-treatment outcome measure mean (in Excel fx =AVERAGE(A1:A10)
   b. Pre-treatment outcome measure SD (in Excel fx =STDEV(A1:A10)
   c. “Post”-treatment outcome measure mean (in Excel fx =AVERAGE(B1:B10)
   d. “Post”-treatment outcome measure SD (in Excel fx =STDEV(B1:B10)
   e. Correlation btwn pre-tx & “post”-tx scores (in Excel fx =CORREL(A1:A10, B1:B10)

2. Normally distributed scores (you can make a histogram as well as use the SKEW and KURT fx s in MS Excel if you have concerns that your pre and/or “post” tx scores aren’t generally shaped like a bell curve)

3. A effect size calculator that can handle repeated measures data: https://www.psychometrica.de/effect_size.html (use Calculator #4 - “Effect size estimates in repeated measures designs”)
Interpret with Caution

• Why interpret PCIT effect sizes with caution?
  
  – ECBI scores are part of graduation criteria and are also an outcome measure.  
    (You might also tend to exclude individuals with low pre-treatment ECBI scores from PCIT.)
  
  – Small samples can have non-normal distributions.
  
  – Missing data
  
  – Pre/post EBCI scores don’t tell the whole story.
Contact Information

Kelly Pelzel, Ph.D.
Clinical Assistant Professor
Department of Psychiatry
Carver College of Medicine
University of Iowa
Iowa City, Iowa
kelly-pelzel@uiowa.edu

Beth Troutman, Ph.D.
Clinical Professor
Department of Psychiatry
Carver College of Medicine
University of Iowa
Iowa City, Iowa
beth-troutman@uiowa.edu