

What Big SIZE you have!

Using Effect Sizes to Measure Impact of Public Health Nursing Interventions

Barbara J. McMorris, PhD
 Karen E. Johnson, PhD, RN
 Lewis Raynor, PhD
 Karen A. Monsen, PhD, RN, FAAN




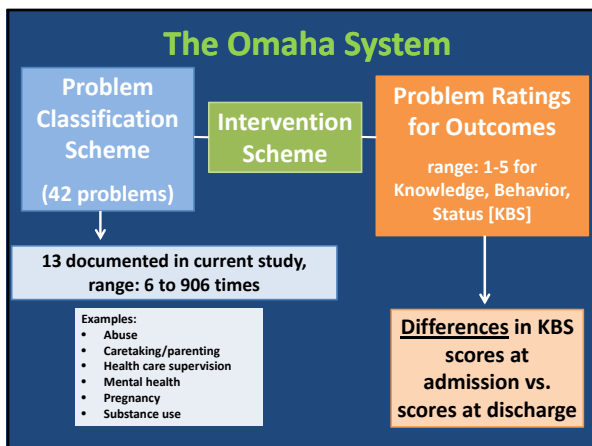
Illustration by Curt Ottewillinger, end of the 19th century. Source: Published by Wilhelm Effenbergler (F. Loewes Verlag), Stuttgart, end of the 19th century.

University of Missouri School of Nursing


Background

- Evaluating client/patient progress
 - Electronic Health Records
 - BIG data = large n's
 - sample size affects statistical tests
- Data from the Omaha System
 - low-income parents discharged from Midwest PHN agency in 2009






Problem



- How to measure treatment effectiveness?
 - statistical tests: $p < 0.05$
 - tell whether differences occurred by chance
 - do not tell much about size of differences

statistical significance \neq practical/clinical significance

Solution: Calculate Effect Sizes




Cohen's D (speculative)		Lipsey (empirical)	
Small effect	0.20	Small effect	0.15
Medium effect	0.50	Medium effect	0.45
Large effect	0.80	Large effect	0.90

Cohen, Jacob (1988) *Statistical Power Analysis for the Behavioral Sciences* 2nd edition (Hillsdale, NJ: Lawrence Erlbaum).

Lipsey, Mark W. (1990) *Design Sensitivity: Statistical Power for Experimental Research* (Newbury Park, CA: Sage Publications).

How to Calculate?



One group pretest-posttest design (RM)

1. $d_{RM} = \frac{\bar{x}_2 - \bar{x}_1}{s_d}$
2. Calculate se of d_{RM} $SE_{dRM} = \sqrt{\frac{2(1-r_{12}) + d_{RM}^2}{n \cdot 2(n-1)}}$
3. Calculate 95% CI

$CI_{dRM} = d_{RM} \pm (1.96 * se_{dRM})$

Or...Let the Computer Do It!



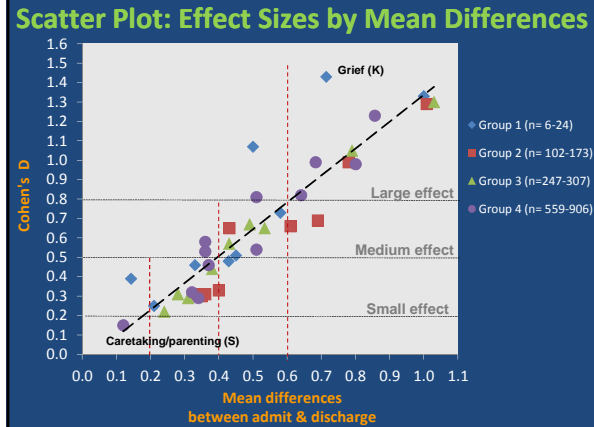
Kadel RP & Kip KE. (2012). A SAS macro to compute effect size (Cohen's d) and its confidence interval from raw survey data. Proceedings of the Annual Southeastern SAS Users Group Conference

<http://analytics.ncsu.edu/sesug/2012/SD-06.pdf>


Midwest PHN 2009 Sample Characteristics (N = 1,016)	
% Female	98
Age (mean) ^a <small>Range 13-66 years</small>	23
Race/ethnicity (%)	
White	32
Black	32
Asian/Pacific Islander	23
Other	13
Hispanic	20
Problems per client (mean) <small>Range 1-13 problems</small>	4.2
Ave length of services (median) <small>Range 2-2954 days</small>	223

**Paired T-Test Results for
KBS Mean Difference Scores**

Problem	Scale	N	Mean diff	p-value	Cohen's d (95% CI)
Cognition	B	24	0.45	0.024	0.51 (0.07, 0.94)
Communication with Community Resources	K	116	0.78	<0.0001	0.99 (0.75, 1.24)
Mental Health	B	247	0.28	<0.0001	0.31 (0.19, 0.44)
Caretaking/ Parenting	S	906	0.12	<0.0001	0.15 (0.10, 0.21)



Implications



- Large effect size = KBS change score of 0.60
- Look beyond p-values
- Effect sizes = standardized metric
 - “easy” to calculate
- Omaha System users should report effect sizes
 - ➔ empirically establish what is practical and clinically meaningful

Thank You!



What Big SIZE you have!

Presented at the First International Conference on Research Methods for Standardized Terminologies, April 3, 2013: Minneapolis, MN

Barbara J. McMorris, PhD
 mcmo0023@umn.edu

UNIVERSITY OF MINNESOTA
 School of Nursing
 Driven to Discover™
