

Methods Matter: The Promise of Empirical Research to Inform Practice - II

The Early Career Forum



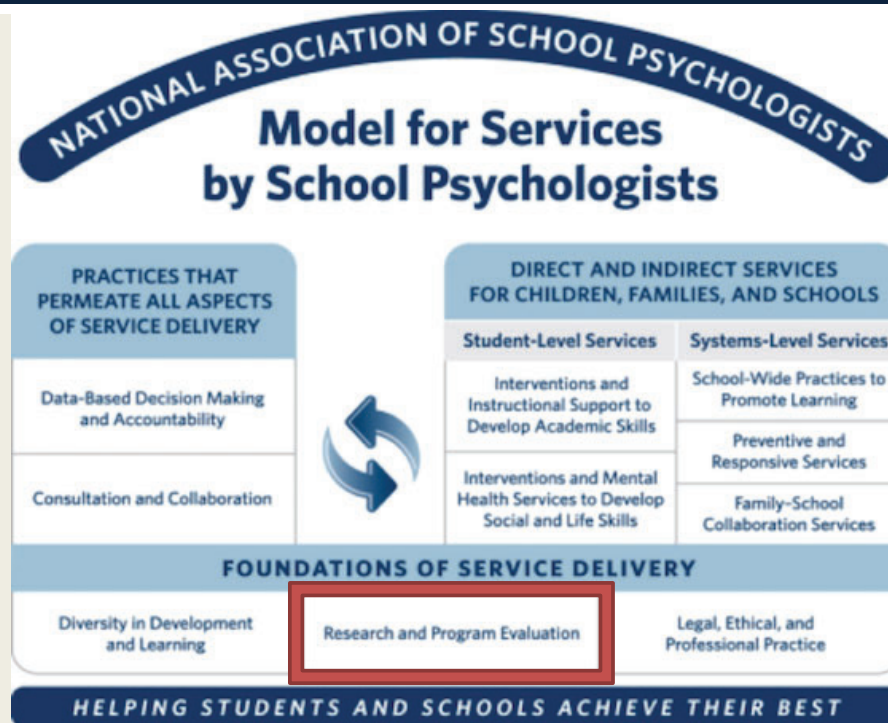
Society for the Study of School Psychology

Early Career Forum

- Chair: Amanda L. Sullivan, University of Minnesota
- Co-chair: Dan Gadke, Mississippi State University
- Convention Lead: Bryn Harris, University of Colorado – Denver
- At-large members:
 - Lindsay Fallon, University of Massachusetts – Boston
 - Ryan Farmer, Oklahoma State University
 - Sally Grapin, Montclair State University
 - Katie Maki, Ball State University
 - Ethan Van Norman, Lehigh University



NASP Practice Model



Background

- Evidence-Based – Quality of scientific evidence that is presented to demonstrate a practice has intended effects (Hoagwood & Johnson, 2003)
- Empirical studies gold standard
- Practicing school psychologists as conduit from research to schools (Keith, 2008)
- School psychologists have limited awareness of what EB Interventions exist (McKevitt, 2012)



What Can We Do?

- Increase the quality and frequency of rigorous empirical studies
- Take steps to ensure:
 - Awareness regarding those practices keeps pace
 - Practitioners have the capacity to implement those practices



Objectives

- Discuss three popular research methodologies likely to encounter when identifying evidence-based practices
- Identify key considerations when reading such articles
- Advice to early career scholars and graduate students pursuing empirical research



Agenda

- Stephen Kilgus (University of Wisconsin-Madison)
 - Diagnostic Accuracy of Screening Tools
- Dave Klingbeil (University of Texas-Austin)
 - Meta-Analytic Techniques
- Amy Briesch (Northeastern University)
 - Generalizability Theory

- Tanya Eckert (Syracuse)
 - Synthesis

- Questions / Discussion Audience



Points Addressed

- Brief Description of Research Line
- Methodological Training
- Making Research “Applied”
- Common Misconceptions
- Outlook for Area



Examining the Diagnostic Accuracy of Universal Screening Tools

Stephen Kilgus, Ph.D.
Associate Professor
University of Wisconsin-Madison

The Early Career Forum



Society for the Study of School Psychology

Research Line

- Development and validation of assessment tools
 - Direct behavior ratings (DBR)
 - Social, Academic, and Emotional Behavior Risk Screener (SAEBRS)
 - Intervention Selection Profile (ISP)
- Situated within argument-based approach to validation
 - Interpretation
 - *Use



Diagnostic Accuracy

- Reliability of population differentiation
- Number of analytic approaches
 - *ROC curve analysis

Common Statistics

- Conditional probabilities
- Likelihood ratios
- Posttest probabilities
- Area under the curve (AUC)



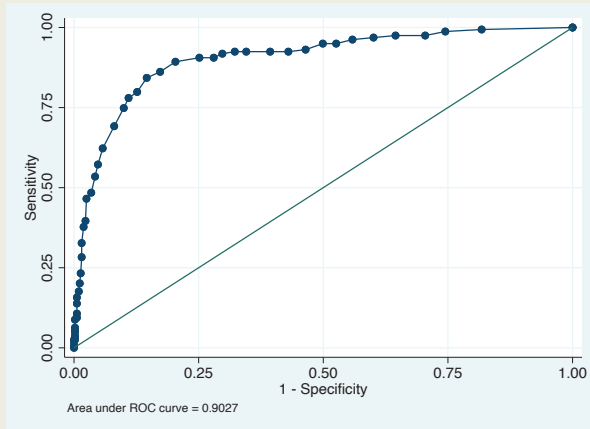
Example Findings

SAEBRS Scale	AUC (95% CI)	SE (95% CI)	SP (95% CI)	PPV	NPV	LR+	LR-
SB	.93 (.88-.92)	0.88 (.85-.92)	0.79 (.77-.82)	0.55	0.96	4.19	0.15
AB	.93 (.88-.92)	0.83 (.79-.87)	0.85 (.83-.87)	0.62	0.95	5.53	0.20
EB	.91 (.87-.92)	0.90 (.86-.94)	0.73 (.71-.76)	0.49	0.96	3.33	0.14
TB	.98 (.97-.98)	0.97 (.95-.99)	0.88 (.86-.90)	0.70	0.99	8.08	0.03

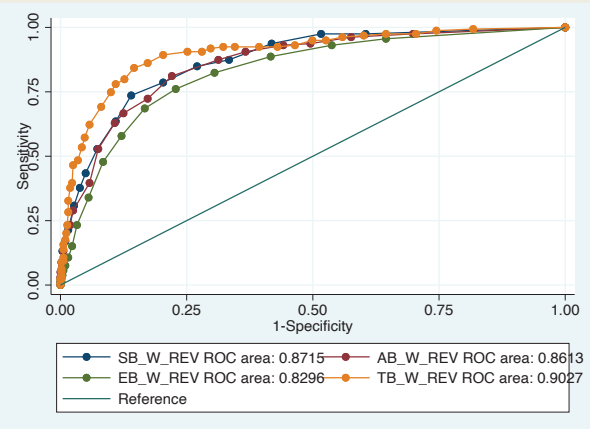


Analytic Options

Examine One Scale

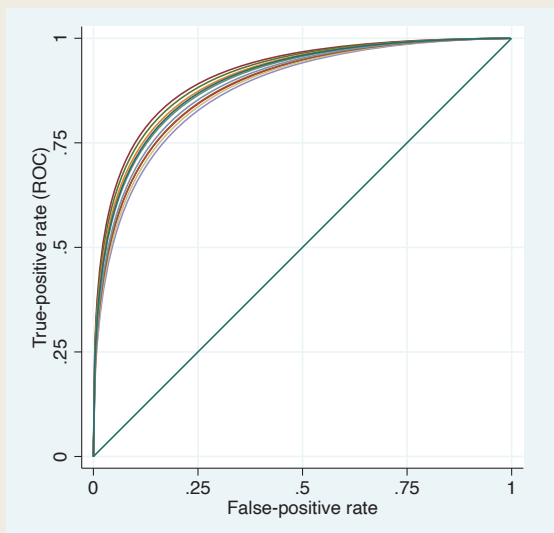


Compare Two Scales

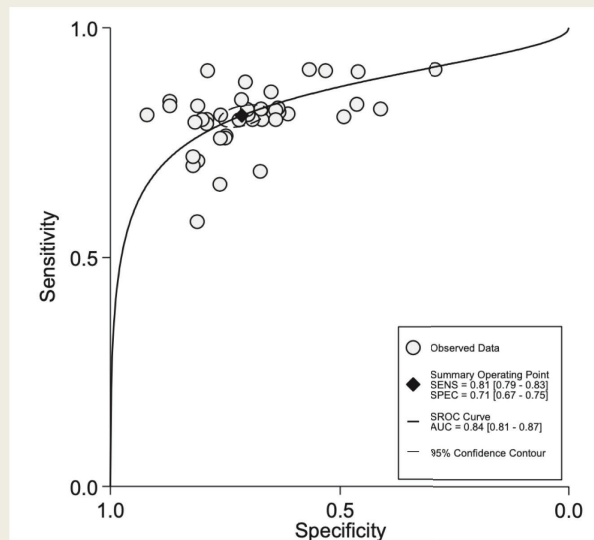


Analytic Options

Examine impacts of covariates

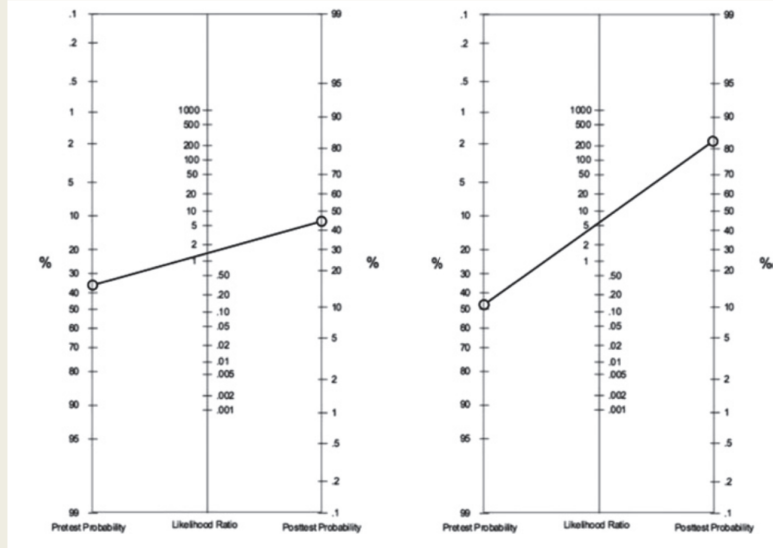


Meta-analyze findings



Analytic Options

- Application of Bayesian logic



Pendergast et al., 2018



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

Knowledge Acquisition

History

- Mostly self-taught (articles, books, etc.)
- Collaboration with colleagues

Ongoing

- Review various software
 - SPSS
 - R (pROC)
 - Stata
- Continuous literature review
 - Education
 - Psychology
 - Medicine



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

Addressing Applied Problems



Ensuring **equity** and reducing **disproportionality**



Enhance **efficiency** of procedures while maintaining **accuracy**



Provide **actionable** information



Common Misconceptions

- Our criteria = truth
 - Acknowledge limitations
 - Include a range of measures/outcomes
- Our findings are generalizable
 - Need to replicate and cross-validate



Outlook

- It's just going to get more complex...
 - Within 10 years, we might be seeing the end of simple scoring → decision
- Use of advanced statistics to reach more accurate and equitable decisions
 - Application of Bayesian statistics
 - Correction for rater effects

	Emotional Behavior		
	Estimate	t	p
Exhaustion	0.00	0.10	.919
Depersonalization	-0.23	-3.08	.003*
Accomplishment	-0.09	-1.79	.079
Self-Efficacy	0.07	2.41	.020*



THANK YOU!

skilgus@wisc.edu



META-ANALYTIC REVIEWS

David A. Klingbeil, University of Texas at Austin



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

Meta-Analytic Reviews (MARS)



Everybody's doing it,
and so can you!

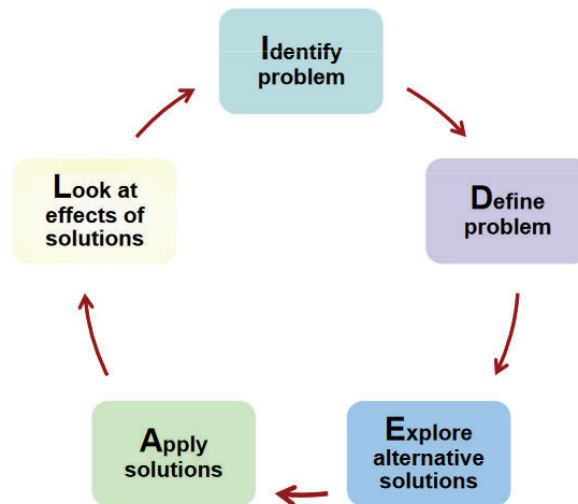


Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

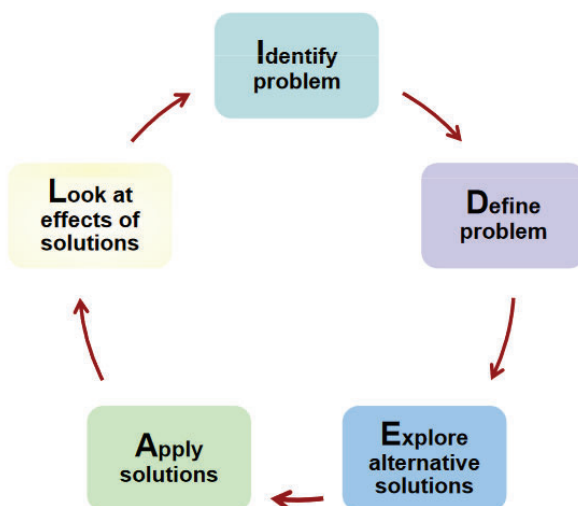
Fitting MARs Into Your Research

The Problem Solving Model: Bransford's IDEAL Model (1984)



Fitting MARs Into My Research

The Problem Solving Model: Bransford's IDEAL Model (1984)



Identify evidence supporting popular educational practices

Does it work, and for whom?



Learning MAR?



SELF TAUGHT, AFTER
GRADUATE SCHOOL...



FOUND INTRODUCTORY
MATERIALS AND
BRANCHED OUT



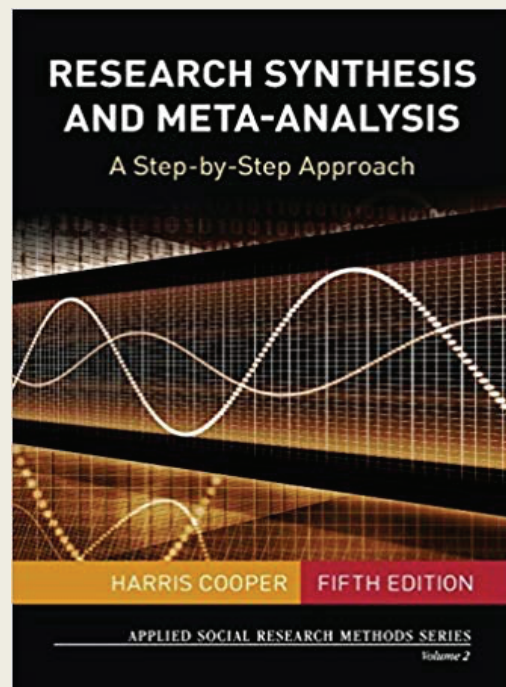
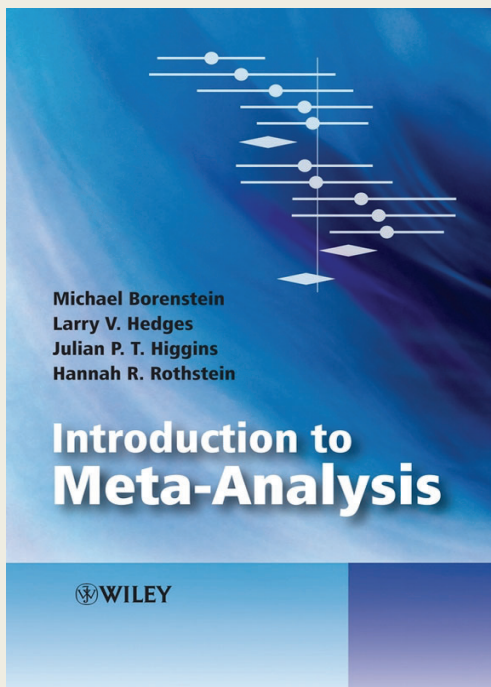
READ!
JOURNAL OF SCHOOL
PSYCHOLOGY
REVIEW OF EDUCATIONAL
RESEARCH
PSYCHOLOGICAL BULLETIN



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

Places to Start



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

Places to Start

Find Published Standards

- Cochrane Reviews Handbook (free!)
 - <https://training.cochrane.org/handbook>
- Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)
 - <http://www.prisma-statement.org>
- APA Reporting Standards
 - Applebaum et al. (2018)



Training Institutes

Modern Meta-Analysis Research Institute (NSF)

- For individuals with no meta-analytic experience
- Open to graduate students and researchers
- Apply by March 1st, 2020

Meta-Analysis Training Institute (IES)

- For individuals with some meta-analysis experience
- Open to individuals with PhD by July 2020
- Apply by April 1st, 2020



Addressing Applied Problems

1. Formulate the problem
2. Comprehensive literature search
3. Extracting Data from Studies
4. Evaluating the Quality of Studies
5. Analysis
6. Interpretation
7. Dissemination

Cooper (2015)



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

Do You Need Specialized Software?

- Comprehensive Meta Analysis program saved me a lot time in extracting effect sizes! (\$400 for 2-year license)
- R more flexible for analysis (free)
 - I've used robumeta and metafor
- Other programs exist: take them for a test drive!
 - (RevMan from Cochrane is free)



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

Potential Misconceptions

- A recent meta-analysis was published, there's no need for another
- Date of article publication = recency of search
- Searching peer-reviewed literature is enough

Cooper (2015)



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

Looking Under the Hood

MARs can vary wildly on the methods used!

- Fixed vs. random effects
- Method of estimating heterogeneity
- Handling of dependent effect sizes
- Methods of estimating potential bias

Do not over-rely on decisions made in published MARs.

Ahn, Ames, & Myers (2012); Scammacca, Roberts & Steubing (2014)



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

Potential Misconceptions

- MARs are fishing expeditions
- MARs are low-hanging fruit OR too time intensive
- Moderator effects are causal
- Moderator effects and tests of heterogeneity are well powered Cooper (2015)



Lessons Learned

- Document everything
- Plan ahead
- Write a comprehensive manuscript that meets standards first!
 - Journal word/page count second



Lessons Learned

- You may find yourself re-running analyses after initial review process
- Teamwork makes the dream work
- When in doubt, email MAR experts
 - Trying to use robust variance estimation?
 - Email Drs. Elizabeth Tipton or Emily Tanner-Smith (can't hurt, right?)!



USING GENERALIZABILITY THEORY TO IMPROVE OUR ASSESSMENT TOOLS

Amy M. Briesch, Ph.D.
Associate Professor
Northeastern University



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

Line of Research

- Goal: To develop and evaluate behavior assessment tools for use within multi-tiered systems of support



Systematic Direct Observation

Direct Behavior Rating (DBR)

Classwide Direct Observation



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>

Generalizability Study

Estimate degree of measurement variance attributable to facets of interest

Examine relative size of variance components in order to determine changes



Decision Study

Calculation of relative generalizability coefficient (ρ^2) and dependability coefficient (Φ)

How would generalizability and dependability coefficients change under different circumstances?



Use of Generalizability Theory in Education Research

- Emphasis placed on use of GT to determine how many raters, passages, occasions, etc. needed to obtain a dependable estimate of X
- However, GT also useful in determining how to modify/improve assessment procedures



Acquiring Methodological Skills

- Began with opportunity to “apprentice” on analyses
- Took course in Measurement Theory
- Reading, talking, practice re-analyzing datasets
- Learn best by teaching/writing
- Keep abreast of new development/applications through Google alerts



Addressing Applied Problems

- Maintain focus on the applied feasibility of tools for practitioners
- Obtain user feedback through interviews, focus groups



Common Misconceptions

- GT can be applied in a post-hoc fashion
- Decisions made in designing the measurement procedure directly influence what generalizations can be made from the findings
 - Instances of a facet should be exchangeable
 - Can only derive meaningful variance components when facets fully crossed



Outlook

- Increased use of GT studies in education/psychology (Briesch, Chafouleas, & Johnson, 2016)
 - 1982-1989 (n = 4)
 - 1990-1999 (n = 13)
 - 2000-2009 (n = 24)
 - 2010-2019 ??
- Use of GT to challenge existing assessment protocols



A Synthesis of Methodological Advances to Improve Practice and Research

Tanya L. Eckert, PhD
Syracuse University

The Early Career Forum



Society for the Study of School Psychology

“If you are the
smartest person in the
room, then you are in
the wrong room.”

-Confucius



Key Implications - Kilgus

- Advancing our knowledge of the diagnostic accuracy of screening tools
 - **SnNOUT**: With highly **S**ensitive tests, a **N**egative result will rule a disorder **OUT**
 - **SpPIN**: With highly **S**pecific tests, a **P**ositive result will rule a disorder **IN**
- Enhancing the efficiency of screening procedures in schools (Kilgus, von der Embse, Taylor, Van Wie, & Sims, 2018)



Key Implications - Kilgus

Assessment instrument and overall rank by average usage per month	Type and rank	Minimum-maximum	M	SD	% Using
68 Scholastic Reading Inventory	ACH 16	0–30	0.25	2.08	4.1
69 Wechsler Abbreviated Scale of Intelligence, Second Edition	COG 9	0–15	0.24	1.03	14.2
70 Developmental Assessment of Young Children, Second Edition	EARLY 2	0–15	0.24	1.34	22.7
71 Cognitive Assessment System, Second Edition	COG 10	0–15	0.23	1.28	8.5
72 Multidimensional Anxiety Scale for Children, Second Edition	SELF 6	0–15	0.23	1.07	15.3
73 Gifted Rating Scales	RS 12	0–35	0.22	1.83	6.7
74 House-Tree-Person	PT 2	0–10	0.22	0.89	16.3
75 Comprehensive Test of Nonverbal Intelligence, Second Edition	COG 11	0–15	0.22	0.87	26.3
76 Direct Behavior Ratings as a rating scale	RS 13	0–15	0.21	1.06	8.0
77 Observation, conditional probability recording form	OB 8	0–20	0.21	1.57	0.6
78 Direct Behavior Ratings as an observation method	OB 9	0–10	0.21	0.96	8.5

Benson, Floyd, Kranzler, Eckert, Fefer & Morgan (2018)

- ✓ Challenge: Improve dissemination efforts to increase usage in the field



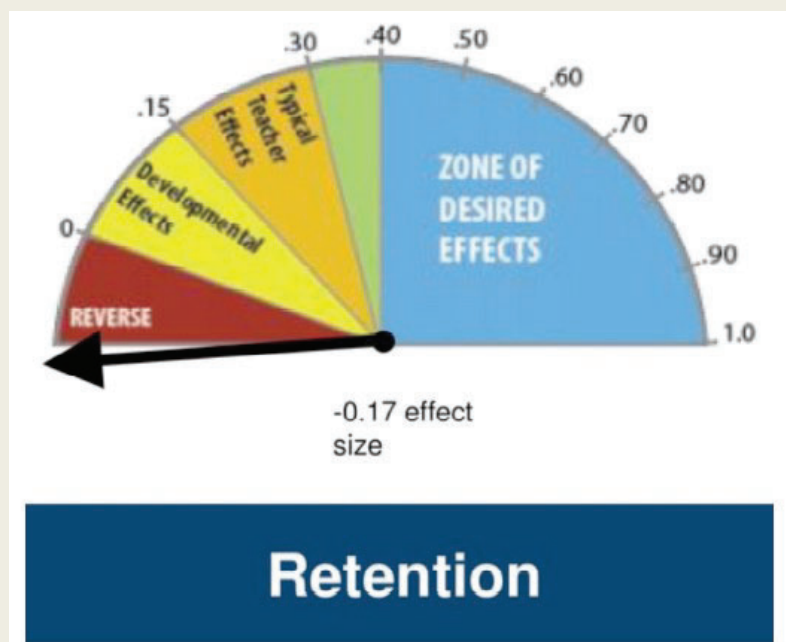
Key Implications - Klingbeil

- Advancing our knowledge regarding the effectiveness of school-based practices
 - Effects can be quantified and compared
 - Moderators can be explored in further detail
- Differentiating 'belief-based' from 'evidence-based' (VanDerHeyden & Coddling, 2019)



Key Implications - Klingbeil

✓ Challenge:
Improve consumers' understanding of findings



Hattie (2009)



Key Implications - Briesch

- Advancing our knowledge regarding contemporary assessment tools
 - Reliability
 - Validity
 - Accuracy
 - Dependability
- Balancing psychometric defensibility with applied feasibility



Key Implications - Briesch

- Importance of adhering to reporting standards for G and D studies (Briesch, Chafouleas, & Johnson, 2016)
 - Design
 - Analysis
 - Results
- ✓ Challenge: Increase usability of findings by translating outcomes for school-based practitioners



Summative Outlook

- Dramatic transformation to advance research methods and practice:
 - Reporting standards and guidelines
 - Open source software
 - Open access publications
 - Social media and online discussions



Online Discussion Example

- SSSP Early Career Forum blog
<https://www.sssp-research.org/earlycareerforum/>

Jan 2020	<i>Resolutions to Improve Your Statistical Fitness</i>	Van Norman
Dec 2019	<i>Publishing Open Access Research as Early Career Scholars</i>	Harris, Farmer, & Grapin
May 2019	<i>Making the Most of Student Research Teams</i>	Fallon, Dever, Hier, Jimerson, & Miller



Areas for Improvement

1) Data Sharing

- Integral component of 21st century scholarship (Martone, Garcia-Castro, & VandenBos, 2018)
 - Facilitate replication, reanalysis, and exploration of new research questions
- <https://www.apa.org/research/responsible/data-links>



Areas for Improvement

2) Multi-Lab Collaborations

- Global partnerships to accelerate data collection
- Psychological Science Accelerator (PSA)
- Multi-lab collaboration of Open Science Framework <https://osf.io/rqzuh/>



Areas for Improvement

3) Replication Studies

- Essential to translate research to practice and implementation science (Forman et al., 2013)
- Account for less than 1% of the total publications in education and psychology (Makel, Plucker, & Hegarty, 2012; Open Science Collaboration, 2015)



Areas for Improvement

4) Pre-Registration of Research

- Establishes transparency, rigor, and reproducibility (Nosek, Ebersole, DeHaven, & Mellor, 2018)
- Distinguishes analyses and outcomes resulting from predictions versus postdictions
- <https://clinicaltrials.gov/> and <https://osf.io/>



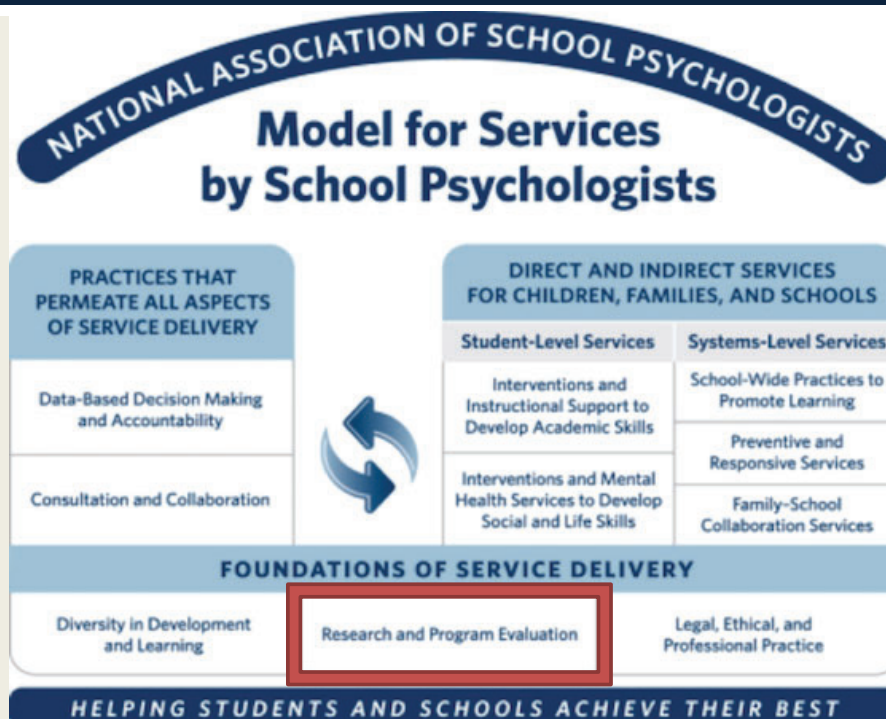
Areas for Improvement

5) Provide Graduate Training Regarding Methodological Advances

- Meta-analysis
- Hierarchical linear modeling
- Structural equation modeling
- Bayesian methods
- Single subject research design



NASP Practice Model



THANK YOU!

taeckert@syr.edu



Society for the Study of School Psychology

<http://sssp-research.org/earlycareerforum>