Matt Tincani

PhD, BCBA-D

Professor and Chairperson
Department of Teaching and Learning
Temple University College of Education & Human Development

- Professor of special education and ABA, focusing on application of applied principles to improve language, social and play skills of learners with autism
- Most recent work explores issues of publication bias in single-case research and advocacy for publishing studies that do not yield experimental effect
- BCBA since 2000 and editorial board member of several journals in fields of special education and behavior analysis

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Publication Bias in ABA Research

Matt Tincani

PhD, BCBA-D

Disclosures

- Dr. Matt Tincani has no relevant financial or non-financial relationships to disclose

Publication Bias in ABA Research

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Learning Objectives

- Be able to define Evidence-Based Practice (EBP)
- Be able to describe the difference between EBP and empirically supported treatments (ESTs)
- Be able to describe the process involved in appraising empirical support
- Be able to identify how publication bias manifests in ABA research
- Be able to define the file drawer effect in ABA research

Today's Talk

What is Evidence-Based Practice (EBP)?

- EBP versus empirically supported treatments (ESTs)
- Appraising Empirical Support

Publication Bias in ABA

- The File Drawer Effect in ABA Research

A Few Recent Related Papers …

Dowdy, A., Tincani, M., & Schneider, J. (2020).
An evaluation of publication bias in response interruption and redirection: A meta-analysis.
Journal of Applied Behavior Analysis, 53, 2151–2171.

Tincani, M., & Travers, J. (2019).
Replication Research, Publication Bias, and Applied Behavior Analysis.
Perspectives on Behavior Science, 42, 59-75.

Tincani, M., & Travers, J. (2018).
Publishing single-case research design studies that do not demonstrate experimental control.
Remedial and Special Education, 39, 118-128.

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What is Evidence-Based Practice?

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What is Evidence-Based Practice?

- Behavior analysts work from a set of coherent principles based in the science and philosophy of behavior analysis
- Behavior analysts use data to guide our decision making
  - And thus our practice is “evidence-based” in one sense
- Behavior analysts seek objective, behaviorally based evidence in support of our practices
  - Peer-reviewed research

What is Evidence-Based Practice?

- Behavior analysts actively eschew interventions that lack sound evidence, or risk harm to consumers
  - Anecdotes, compelling videos, memes, podcasts, social media posts, etc. are not enough; we need data

- **Show me the data!**

https://www.youtube.com/watch?v=SJXbSZK1Pps

What is Evidence-Based Practice?

EBP: One definition

A specific intervention or
treatment that meets a predefined threshold of
credible evidence (e.g., Smith, 2014)

Amount
of evidence?

Quality
of evidence?

Thresholds of Evidence:
Examples

Kratochwill et al. (2010/2013)

WWC Single-Case Technical Design Documentation

At least five high quality single-case research design studies

5

x

Conducted by three different research teams

3

x

With a total of 20 individuals / cases

20

Thresholds of Evidence: Examples

Council for Exceptional Children (2014)

Two methodologically sound group comparison studies (e.g., RCT) with at least 60 participants across studies

National Autism Standards Report (2015)

Two group design or four single subject studies with a minimum of 12 participants

Research Findings for Children, Adolescents, and Young Adults (Under 22 Years)

Established Interventions for Individuals Under Age 22

In the following pages, we provide a detailed definition and description for each of the 14 Established Interventions identified for this population in Phase 2 of the National Standards Project.

You may already be familiar with some of these options. Many volumes have been published on each of these interventions; we encourage you to learn more about those that might be most useful to you.

The following interventions have been identified as falling into the Established level of evidence:

- Behavioral Interventions
- Cognitive Behavioral Intervention Package
- Comprehensive Behavioral Treatment for Young Children
- Language Training (Production)
- Modeling
- Natural Teaching Strategies
- Parent Training
- Peer Training Package
- Pivotal Response Training
- Schedules
- Scripting
- Self-management
- Social Skills Package
- Story-based Intervention

EVIDENCE-BASED PRACTICES

***Indicates practices with newly developed content (2015). Select the practice to access these modules and downloadable resources.**

Antecedent-based Intervention (ABI)*

Cognitive Behavioral Intervention (CBI)**

Differential Reinforcement of Alternative, Incompatible, or Other Behavior (DRA/I/O)

Discrete Trial Teaching (DTT)*

Exercise (ECE)*

Extinction (EXT)

Functional Behavior Assessment (FBA)*

Functional Communication Training (FCT)

Modeling (MD)*

Naturalistic Intervention (NI)

Parent-implemented Intervention (PII)

Peer-mediated Instruction and Intervention (PMII)*

Picture Exchange Communication System (PECS)*

Pivotal Response Training (PRT)

Prompting (PP)*

Reinforcement (R+)*

Response Interruption/Redirection (RIR)

Scripting (SC)**

Self-management (SM)

Social Narratives (SN)*

Social Skills Training (SST)*

Previously Social Skills Groups

Structured Play Group (SPG)**

Task Analysis (TA)*

Technology-aided Instruction and Intervention (TAII)** *Previously Computer Aided Instruction and Speech Generating Devices*

Time Delay (TD)*

Video Modeling (VM)

Visual Support (VS)*

** Indicates new EBP identified in 2014 review. Practice briefs are not available for these practices, but are currently being developed as part of AFIRM.

See the working definitions of each EBP in this excerpt from the 2014 Evidence-Based Practices for Children, Youth, and Young Adults with Autism Spectrum Disorder report. The full report is available here.

Evidence-Based Practice

Problems with this definition of EBP as a specific practice or treatment

Practice is a much broader activity than implementing a single intervention or treatment

What happens when there isn't an established treatment available to solve a particular clinical problem?

A practice may have empirical evidence, but will it work equally well with all individuals and in all situations?

Crozier & Tincani (2005)

Social Story Text: Talking at School

At school I play games and work.
I like to talk to the teachers.
When I want to talk to the teachers, I don't call out.
I put up my hand.
I look at the teacher.
I wait quietly.
When the teacher talks to me, then I can talk.
Everyone is happy when I put up my hand and wait.

But the kid can't read?

Is this still an EBP?

Evidence-Based Practice

A better definition
(Slocum et al., 2014)

EBP is a decision-making process that incorporates

- Best available evidence
- Client values and context
- Clinical expertise

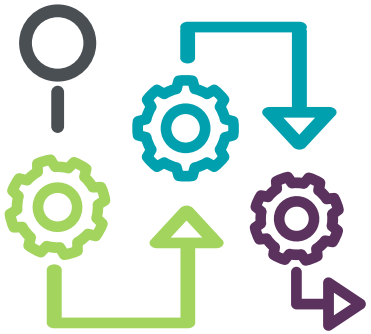
More than just an empirically supported treatment (EST)

- Or a collection of treatments

Evidence-Based Practice

Appraising Empirical Support

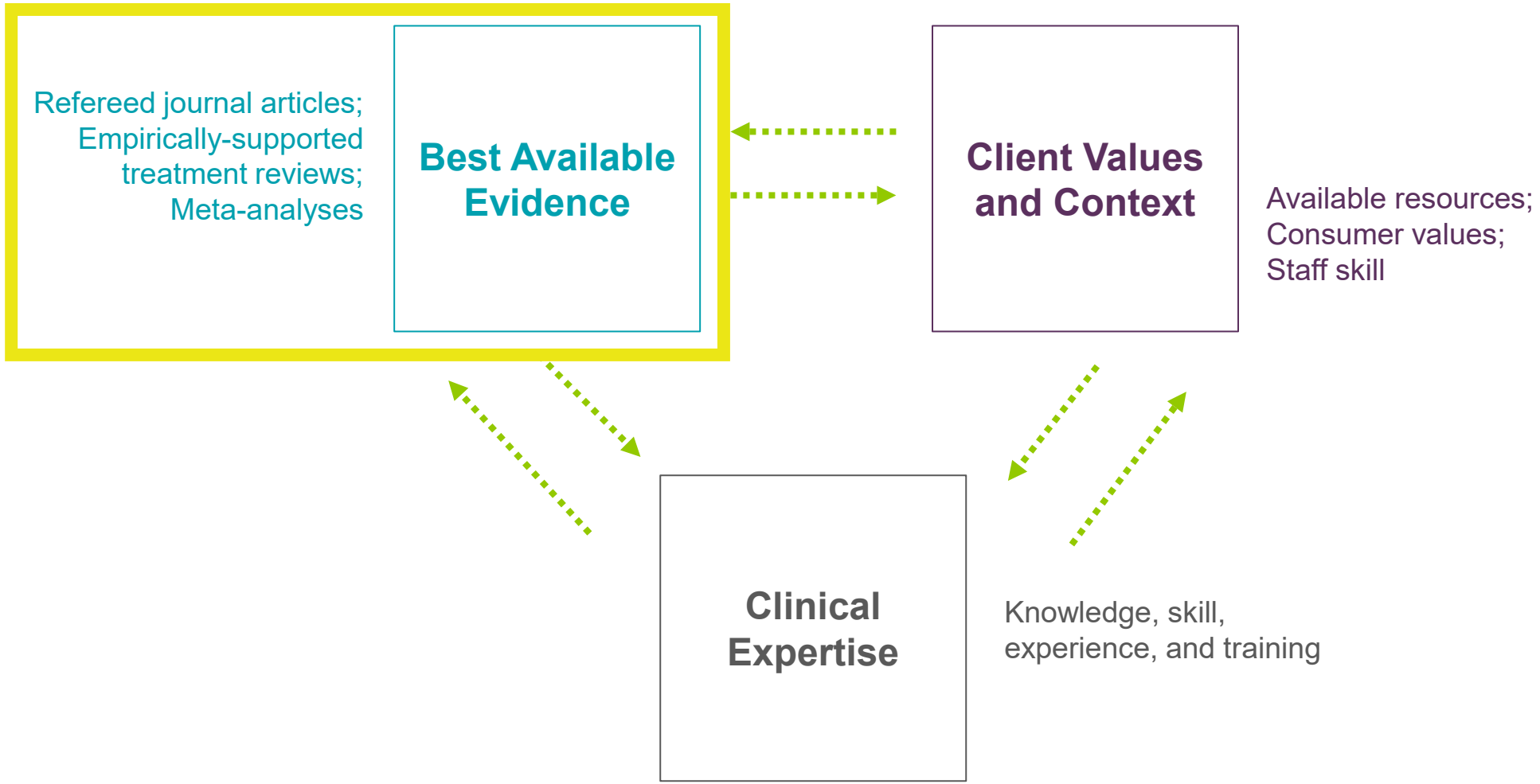
Individual studies



Systematic Reviews
Empirically-supported treatment reviews

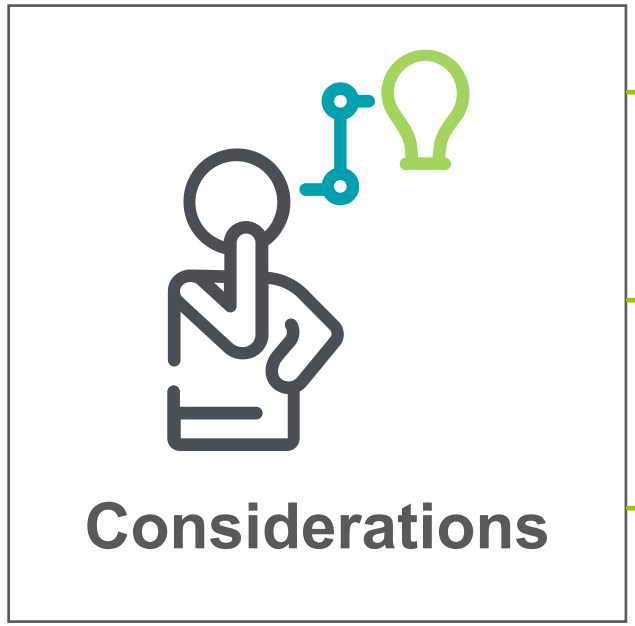
Meta-Analysis

Evidence-Based Practice



Individual Studies

How do we identify ESTs based upon examining evidence from individual studies?



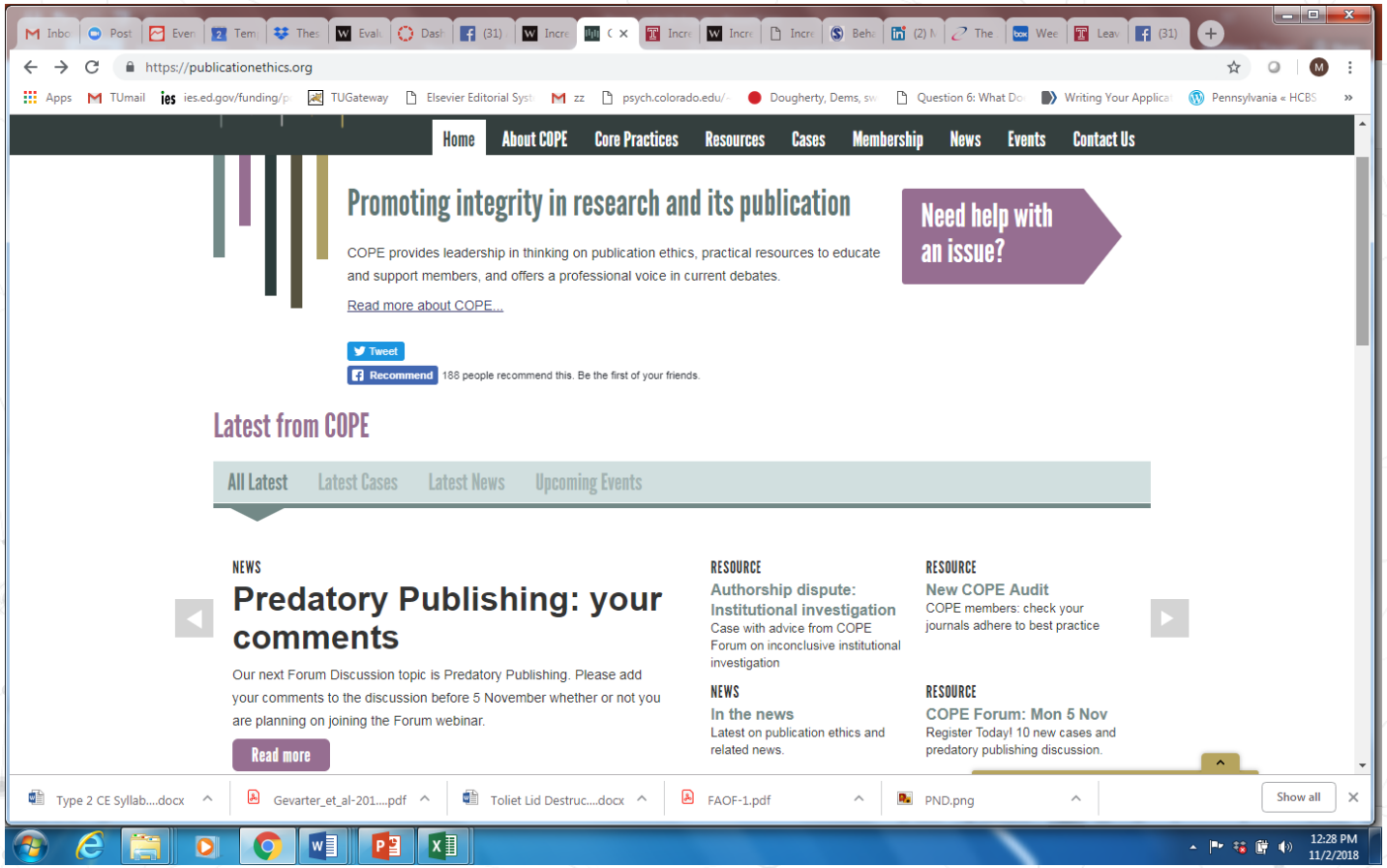
- Peer-review
- Methodological rigor
- Treatment effect

Individual Studies

Peer Review

- Article is exposed to double blind review from at least two peer reviewers
- Editorial independence of editor(s), associate editor(s), author(s), and reviewer(s)
- Beware of predatory journals
  - Pay to publish
  - Absence of peer review and quality control

Committee on Publication Ethics (COPE)



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Individual Studies

Methodological Rigor

- Methodological rigor
  - To what extent does a study meet high standards of rigor and quality?
- Horner et al. (2005) Quality standards for single-subject research
- Kratochwill et al. (2010/2013) WWC Single-Case Technical Design Documentation

TABLE 1

Quality Indicators Within Single-Subject Research

Description of Participants and Settings

- Participants are described with sufficient detail to allow others to select individuals with similar characteristics (e.g., age, gender, disability, diagnosis).
- The process for selecting participants is described with replicable precision.
- Critical features of the physical setting are described with sufficient precision to allow replication.

Dependent Variable

- Dependent variables are described with operational precision.
- Each dependent variable is measured with a procedure that generates a quantifiable index.
- Measurement of the dependent variable is valid and described with replicable precision.
- Dependent variables are measured repeatedly over time.
- Data are collected on the reliability or interobserver agreement associated with each dependent variable, and IOA levels meet minimal standards (e.g., IOA = 80%; Kappa = 60%).

Independent Variable

- Independent variable is described with replicable precision.
- Independent variable is systematically manipulated and under the control of the experimenter.
- Overt measurement of the fidelity of implementation for the independent variable is highly desirable.

Baseline

- The majority of single-subject research studies will include a baseline phase that provides repeated measurement of a dependent variable and establishes a pattern of responding that can be used to predict the pattern of future performance, if introduction or manipulation of the independent variable did not occur.
- Baseline conditions are described with replicable precision.

Experimental Control/Internal Validity

- The design provides at least three demonstrations of experimental effect at three different points in time.
- The design controls for common threats to internal validity (e.g., permits elimination of rival hypotheses).
- The results document a pattern that demonstrates experimental control.

External Validity

- Experimental effects are replicated across participants, settings, or materials to establish external validity.

Social Validity

- The dependent variable is socially important.
- The magnitude of change in the dependent variable resulting from the intervention is socially important.
- Implementation of the independent variable is practical and cost effective.
- Social validity is enhanced by implementation of the independent variable over extended time periods, by typical intervention agents, in typical physical and social contexts.

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What Works Clearinghouse

SINGLE-CASE DESIGN TECHNICAL DOCUMENTATION
Version 1.0 (Pilot)

Developed for the What Works Clearinghouse by the following panel:

Kratochwill, T. R.
Hitchcock, J.
Horner, R. H.
Levin, J. R.
Odom, S. L.
Rindskopf, D. M.
Shadish, W. R.

June 2010

Recommended citation:
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.

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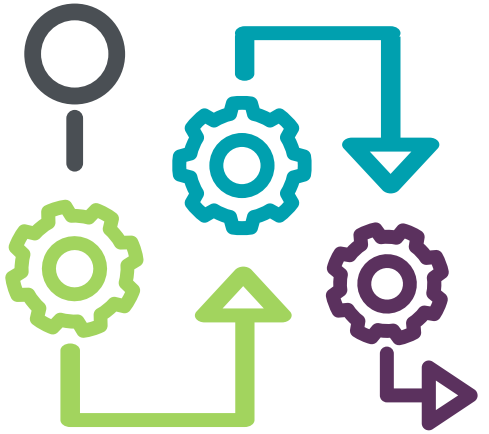
Individual Studies

Treatment Effect

- Recommendations
  - Individual studies should meet least most / all quality indicators
  - Researchers should interpret data both visually and with an ES estimate (more later)
- BUT, examining an individual study gives us only limited information on how well a particular EST works

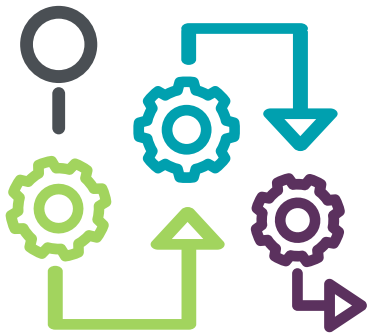
Systematic Reviews

A type of review that systematically follows a specific set of procedures to address one or more research questions



Systematic Reviews — Components

- A set of guiding research questions
- Study identification and extraction
- Study interpretation
- Report results
- Conclusions



Special Issue Article

A Systematic Review of Parent-Implemented Functional Communication Training for Children With ASD

Behavior Modification
2018, Vol. 42(3) 335–363

DOI: 10.1177/0145445517740872
journals.sagepub.com/home/bmo
SAGE

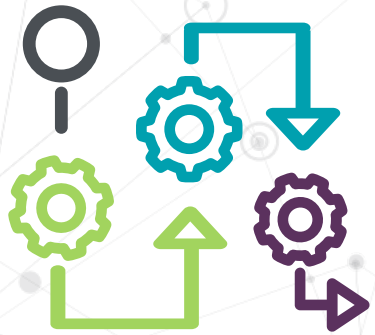
Stephanie Gerow[1], Shanna Hagan-Burke[2], Mandy Rispoli[3], Emily Gregori[3], Rose Mason[3], and Jennifer Ninci[4]

Abstract

Supporting parents in reducing challenging behavior of children with autism spectrum disorder (ASD) requires the identification of effective, feasible, and sustainable interventions. Functional communication training (FCT) is one of the most well-established interventions in the behavioral literature and is used increasingly by parents. However, there is a need for additional evaluation of the literature related to parent-implemented FCT. In the present review, we identified 26 peer-reviewed studies on parent-implemented FCT. We conducted systematic descriptive and social validity analyses to summarize the extant literature. Across studies, parent-implemented FCT was effective in reducing child challenging behavior, and in some cases, intervention outcomes maintained and generalized to novel settings and implementers. However, few studies reported fidelity data on parent implementation of FCT, and data regarding sustained use of FCT by parents were limited. Results of the social validity analysis indicate that

[1]Baylor University, Waco, TX, USA
[2]Texas A&M University, College Station, TX, USA
[3]Purdue University, West Lafayette, IN, USA
[4]University of Hawai'i at Manoa, Honolulu, HI, USA

Corresponding Author:



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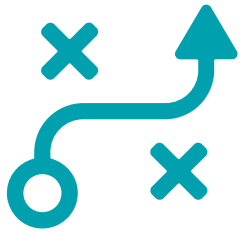
Types of Research Questions in Systematic Reviews

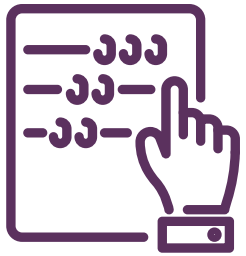
Characteristics of participants and settings

Disability type? Race ethnicity?



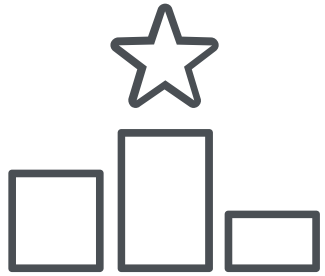
Characteristics of interventions

Strategies? Implementers?



Outcomes measured

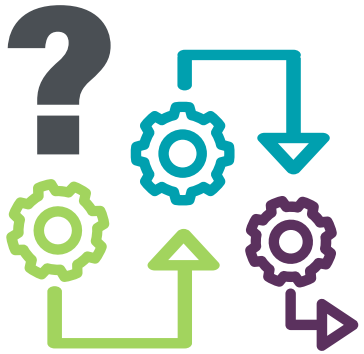
What kinds of skills were taught?



Outcomes attained

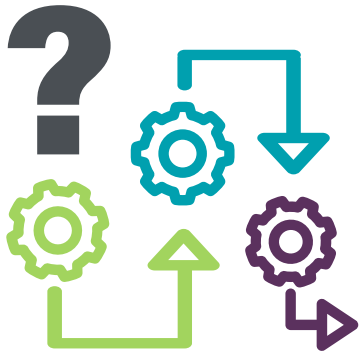
How successful?

Research Questions for Systematic Reviews



- What was the race, ethnicity, or nationality of participants in studies used to qualify each evidence-based practice for students with ASD?
  (West, Travers, & Kemper, 2016)
- Which verbal operants have been taught in the speech generating device research literature?
  (Tincani, Miller, Nepo, & Lorah, under review)
- What are the participant and setting characteristics of sensory-based interventions
  (Barton, Reichow, Schnitz, Smith, & Sherlock, 2015)

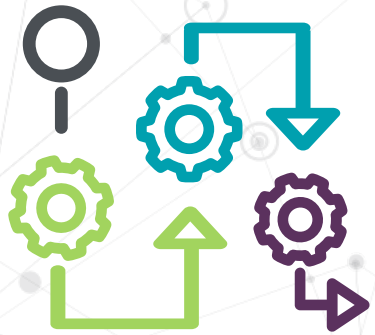
Research Questions for Systematic Reviews



Tincani, M., Miller, J., Nepo, K., & Lorah, E. R. (in press). Systematic Review of Verbal Operants in Speech Generating Device Research from Skinner's Analysis of Verbal Behavior. *Perspectives on Behavior Science.*

- Which verbal operants have been taught in the speech generating device research literature?

Citation	Design	Authors' dependent variable definition	Verbal Operants Taught	Convergent / Divergent	Antecedent Stimuli	Consequent Stimuli	N Participants	Diagnoses	Device
van Acker, R. & Grant, S. H. (1995). An effective computer-based requesting system for persons with Rett syndrome. *Journal of Childhood Communication Disorders, 16*, 31-38.	Single-subject	Touch screen responses	Mand-tact-intraverbals	Convergent	Preferred item + "Would you like some _____?"	Access to preferred item	3	Rhett's Syndrome (IDD)	Amiga 500 computer
Drager, K. D., Light, J. C., Carlson, R., D'Silva, K., Larsson, B., Pitkin, L., & Stopper, G. (2004). Learning of dynamic display AAC technologies by typically developing 3-year-olds: Effect of different layouts and menu approaches. *Journal of Speech, Language, and Hearing Research*, 47(5), 1133-1148.	Group	Accuracy in locating target vocabulary items	Tact-intraverbals	Convergent	A picture depicting a scene + interventionist questions about the scene.	Feedback from a script	30	Typically developing	DynaVox
Bock, S. J., Stoner, J. B., Beck, A. R., Hanley, L., & Prochnow, J. (2005). Increasing functional communication in non-speaking preschool children: Comparison of PECS and VOCA. *Education and Training in Developmental Disabilities*, 40, 264-278.	Single-subject	Requesting	Mand-tacts	Convergent	Presence of preferred item	Access to preferred item	6	Developmental Delay	Go Talk
Bruno, J., & Trembath, D. (2006). Use of aided language stimulation to improve syntactic performance during a weeklong intervention program. *Augmentative and Alternative Communication, 22*, 300–13. doi: 10.1080/07434610600768318	Single-subject	Syntactic performances - complexity of aided messages composed	Tact-intraverbals	Convergent	Story board + questions from interventionist	Unspecified	9	IDD	DynaMyte, Pathfinder, E-Talk, DynaVox
Olive, M. L., de la Cruz, B., Davis, T. N., Chen, J. M., Lang, R. B., O'Reilly, M. F., et al. (2007). The effects of enhanced milieu teaching and a voice output communication aid on the requesting of three children with autism. *Journal of Autism and Developmental Disorders, 37*, 1505-1513.	Single-subject	Gestures, vocalizations, and VOCA use	Mand-tacts	Convergent	"Environmental arrangement strategies such as in sight and out of reach to promote requesting" (p. 1509)	Access to desired outcome/objects, paired with expansion of VOCA recording "e.g., You want more cars?"	3	ASD	Cheap Talk 4 In-Line Direct
Beck, S. J., Stoner, J. B., Bock, S. J., & Parton, T. (2008). Comparison of PECS and VOCA: A replication. *Education and*	Single-subject	Accessing a picture to produce digitized speech	Mand-tacts	Convergent	Presence of preferred item	Access to preferred item	4	Children attending ASD	Go Talk



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What Makes for a High Quality Systematic Review?

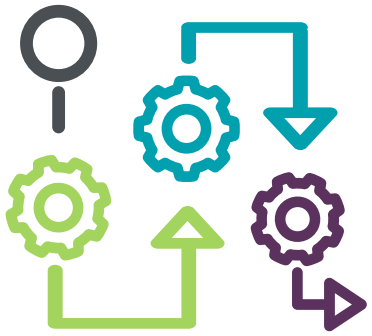
Relevant research questions

Extraction procedure identifies all relevant studies

Study results are analyzed and interpreted in a rigorous and unbiased manner

Conclusions are supported by the data

Empirically-Supported Treatment Reviews



- Type of Systematic Review
- National Autism Center, National Standards Project (2015)
  - http://www.nationalautismcenter.org/national-standards-project/
  - Identified 14 established interventions for individuals under 22 years-old

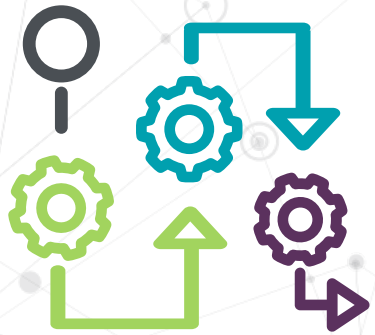
Table 3} Strength of Evidence Classification System

Established	Emerging	Unestablished
Several[a] published, peer-reviewed articles • SMRS scores of 3, 4, or 5 • Beneficial intervention effects for a specific target These may be supplemented by studies with lower scores on the Scientific Merit Rating Scale.	Few[b] published, peer-reviewed articles • SMRS scores of 2 • Beneficial intervention effects reported for one dependent variable for a specific target These may be supplemented by studies with lower scores on the Scientific Merit Rating Scale.	May or may not be based on research • Beneficial intervention effects reported based on very poorly controlled studies (scores of 0 or 1 on the Scientific Merit Rating Scale) • Claims based on testimonials, unverified clinical observations, opinions, or speculation • Ineffective, unknown, or adverse intervention effects reported based on poorly controlled studies

[a] Several is defined as 2 group design or 4 single-subject design (SSD) studies with a minimum of 12 participants for which there are no conflicting results or at least 3 group design or 6 SSD studies with a minimum of 18 participants with no more than 10% of studies reporting conflicting results. Group and SSD methodologies may be combined.

[b] Few is defined as a minimum of 2 group design studies or 2 SSD studies with a minimum of 6 participants for which no more than 10% of studies reporting conflicting results are reported.* Group and SSD methodologies may be combined.

*Conflicting results are reported when a better or equally controlled study that is assigned a score of at least 3 reports either {a} ineffective intervention effects or {b} adverse intervention effects.



Research Findings for Children, Adolescents, and Young Adults (Under 22 Years)

Established Interventions for Individuals Under Age 22

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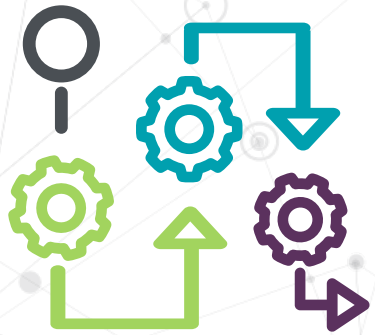

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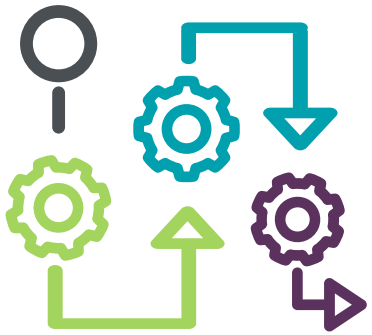
Empirically-Supported Treatment Reviews



- National Professional Development Center on ASD
  - http://autismpdc.fpg.unc.edu/evidence-based-practices
- Reviewed 456 methodologically rigorous ASD intervention studies (Wong et al., 2015)
- Identified 27 ESTs for individuals with ASD, birth – 22 years

EVIDENCE-BASED PRACTICES

***Indicates practices with newly developed content (2015). Select the practice to access these modules and downloadable resources.**

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Differential Reinforcement of Alternative, Incompatible, or Other Behavior (DRA/I/O)

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Video Modeling (VM)

Visual Support (VS)*

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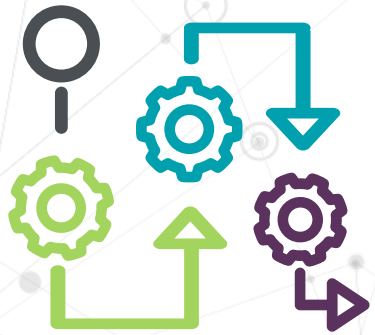

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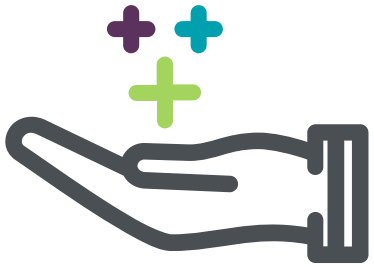
Empirically-Supported Treatment Reviews



Benefits

- Disseminates information about ESTs to broader community
- Don’t require access to refereed articles or sophisticated research skills

Drawbacks

- Only includes published literature
  - Non-effect studies?
- Intervention categories and thresholds can be arbitrary / nebulous

Meta-Analysis

- Incorporates all steps of a systematic review
- But, one or more effect sizes metrics is calculated to determine treatment effect across the studies
  - Cohen's *d*, Hedge's *g,* r, PND, PAND, Tau – U, etc.

Meta-Analysis

- Yields an overall effect size for an intervention
- Can also be used to identify moderating variables for an intervention
  - What makes an intervention more or less effective?
- Can be used to answer questions about the effectiveness of interventions

Example Meta-Analysis (Tincani & Devis, 2011)

Table 2. PND Score Means and Standard Deviations for Picture Exchange Communication System (PECS) by Participant Characteristics

	PND		
Participant Characteristic	*n*	*M*	*SD*
Diagnosis			
Autism or PDD-NOS	21	75.4	28.8
Other	20	85.0	24.1
Gender			
Male	31	80.8	25.8
Female	10	77.6	30.8
Age			
Preschool	17	80.5	23.8
School age	13	71.3	34.8
Adult	11	89.7	17.3
Highest PECS phase mastered			
I	3	45.5	32.2
II	6	81.1	19.9
III	20	82.5	26.8
IV	8	76.7	28.6
Not reported	4	99.0	2.1
Setting			
Single	34	81.8	26.4
Multiple	7	71.5	28.7

Note: PND = percentage nonoverlapping data; PDD-NOS = pervasive developmental disorder, not otherwise specified.

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ES Metrics

PND

PAND

Tau – U

Hedge's g

Log Response Ratio

Publication Bias in ABA Research

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Publication Bias in ABA Research

A few preliminary comments

Questionable research practices are not exclusive to ABA research

These have been widely documented across the social, behavioral, and clinical sciences

The presence of publication bias does not necessarily invalidate ABA research

Though it is important to understand and document

The File-Drawer Effect

Single-case research (experimental) design

- The primary experimental approach of BA / ABA
- Individual as unit of analysis, repeated measures of behavior, active manipulation of IV, etc.

The File-Drawer Effect

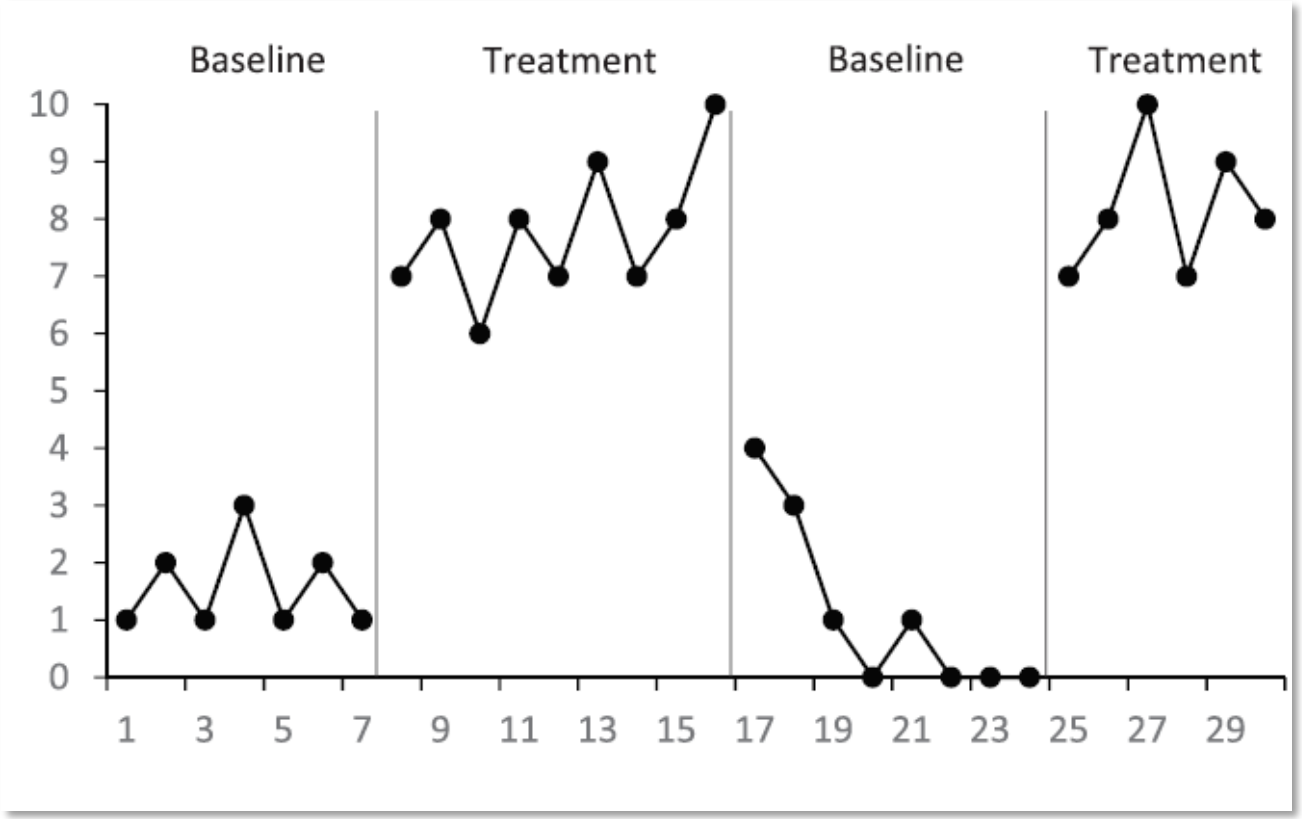
Experimental control is regarded as an essential feature of high quality SCRD

- Baer, Wolf, & Risley (1968): “An experimenter has achieved an analysis of a behavior when he can **exercise control over it**.” (p. 94)
- Horner et al. (2005): “Single-subject designs provide experimental documentation of **unequivocal relationships between manipulation of independent variables and change in dependent variables.”** (P. 169)

In Other Words …

Good study = strong experimental control

Except when…



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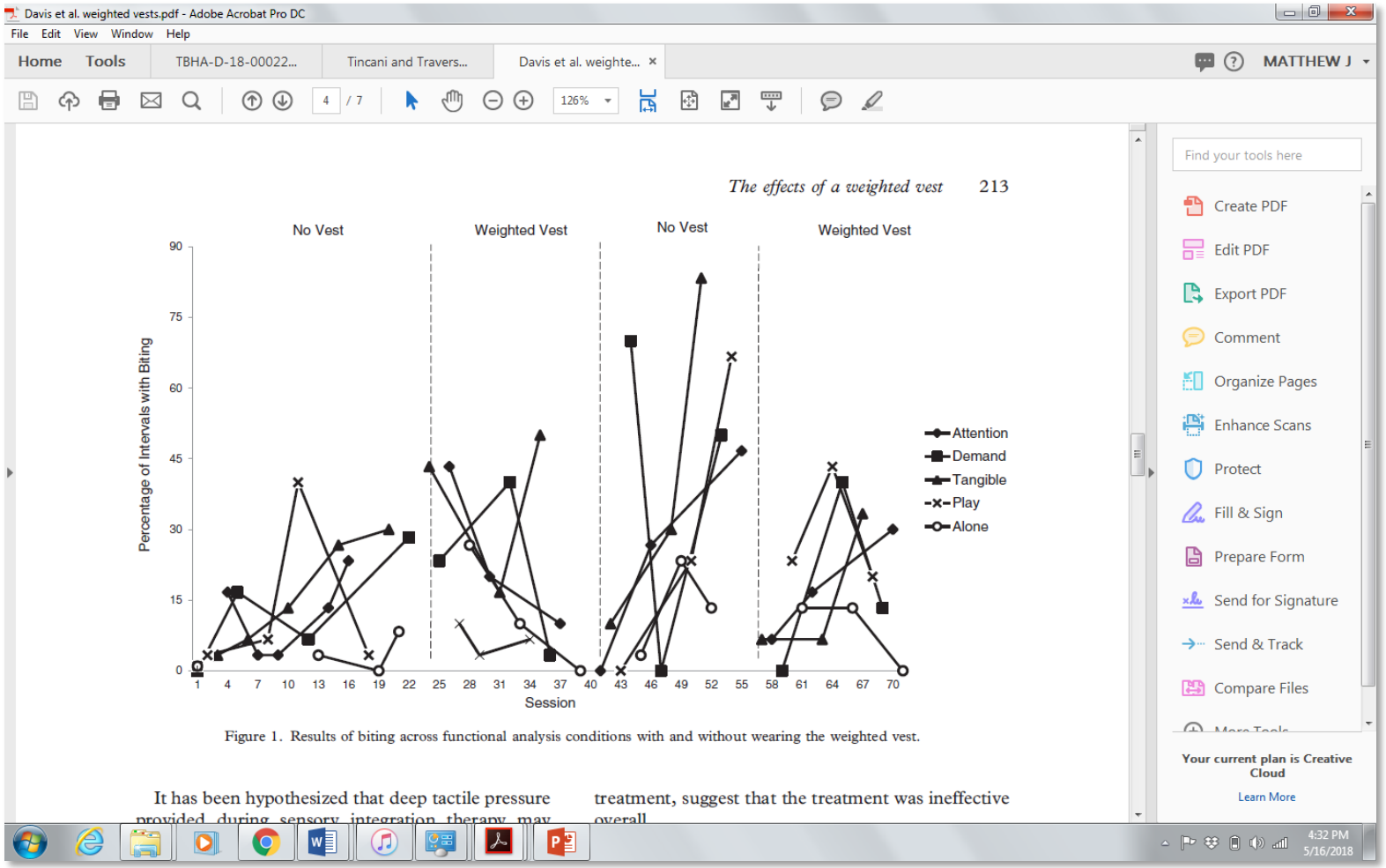
We Don’t Like the Intervention



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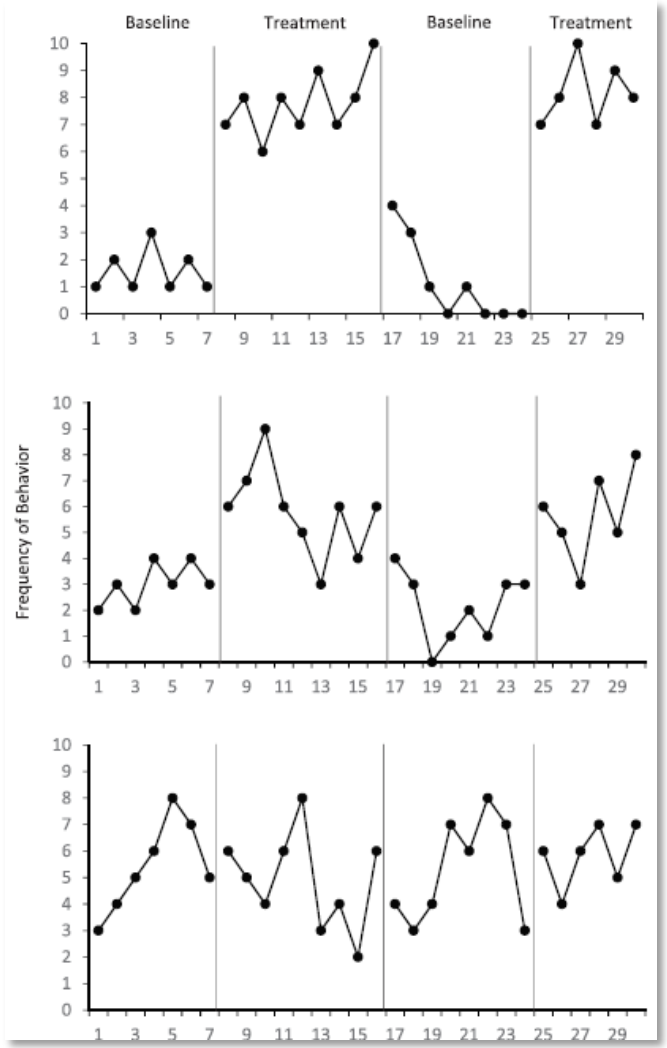
What is a Non – Effect Study?

Sometimes called “negative effect” or “null” studies

(Kratochwill, Levin, Horner, 2018)



A research study that fails to yield full experimental control

The File-Drawer Effect

- Studies that fail to demonstrate treatment effect (e.g., statistically significant results) get tossed into the file drawer (Rosenthal, 1979)
  - Why? Experimenter bias and publication bias
- Well documented problem in psychology, business, economics, and medicine
  - Open Science Collaboration (2015) – 100 replications of publications from prominent psychology journals
  - Only 36% of replications had significant results

The File-Drawer Effect

- The resulting published literature is biased
- Non-effect studies remain in the gray literature (e.g., theses, dissertations)
- Reviews that rely exclusively on published literature may reflect publication biases
  - Empirically supported treatment reviews

The File-Drawer Effect: Is this a Problem for ABA Research?

Mahoney (1977) presented 75 JABA reviewers with hypothetical datasets demonstrating varying degrees of experimental control

- Reviewers rated manuscripts demonstrating strong experimental control more positively, even though procedures were the same

The File-Drawer Effect: Is this a Problem for ABA Research?

Sham and Smith (2014) compared effect sizes for published and unpublished SCRD studies on pivotal response treatment

- Published studies had larger effect sizes
- Partially replicated by Dowdy, Tincani, and Schneider (2020) for RIRD

Shadish, Zelinsky, Vevea, and Kratochwill (2016) presented SCRD experts with hypothetical SCRD datasets

- A majority reported that they were more likely to recommend publication when datasets showed positive effects

Why is this a Problem?

If non-effect studies do not enter the research literature, positive intervention findings are exaggerated

EST reviews and meta-analyses must include gray literature

- Master's theses, doctoral dissertations

More Pitfalls …

The New York Times

Opinion

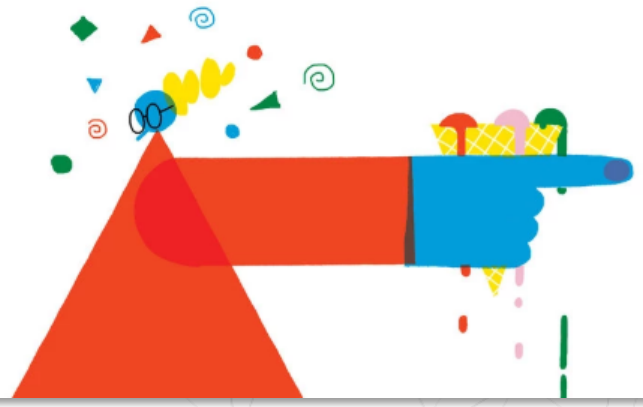
Science Confirms It: People Are Not Pets

Research on the efficacy of rewards tells us that we can't bribe others into doing what we want.

By Alfie Kohn

Mr. Kohn is an author and lecturer who specializes in human behavior and education.

Oct. 27, 2018



Evidence of increased PTSD symptoms in autistics exposed to applied behavior analysis

Author(s): Henny Kupferstein, (Independent Researcher, San Diego, California, USA)

Abstract:

Purpose

The purpose of this paper is to examine the prevalence of posttraumatic stress symptoms (PTSS) in adults and children who were exposed to applied behavior analysis (ABA) autism early childhood intervention. Using an online questionnaire to survey autistic adults and caregivers of autistic children, the author collected data from 460 respondents on demographics, intervention types, and current pathological behaviors with symptom severity scales. This study noted PTSS in nearly half of ABA-exposed participants, while non-exposed controls had a 72 percent chance of being asymptomatic. ABA satisfaction ratings for caregivers averaged neutral or mild satisfaction. In contrast, adult satisfaction with ABA was lower on average and also tended to take on either extremely low or extremely high ratings. Exposure to ABA predicted a higher rate and more severe PTSS in participants, but the duration of exposure did not affect satisfaction with the intervention in caregivers.

Design/methodology/approach

Participants were recruited for an online survey through social media networks, adult gatherings, social skills groups, and autism support groups nationwide. Adult inclusion criteria consisted of autism – diagnosed or self-diagnosed – and an age of 18 or older. A total of 460

Journal Information

Advances in Autism

ISSN: 2056-3868
Online from: 2015
Subject Area: Health & Social Care

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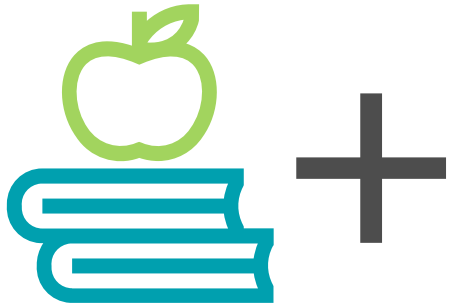
Conclusions



Evidence-based practice is more than a collection of empirically supported treatments

We must always practice according to the best available research evidence

- Even when it refutes our theories, principles, and investments

Questions

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