

Evidence-Based Early Childhood Intervention Practices: Types of Studies and Research Syntheses

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Overview

- Describe the purposes of different types of studies in early childhood intervention and other fields
- Describe a framework for categorizing different types of research syntheses for identifying evidence-based early childhood intervention practices
- Describe a practice-based approach to conducting research syntheses to identify which practice characteristics matter most in terms of positive intervention outcomes

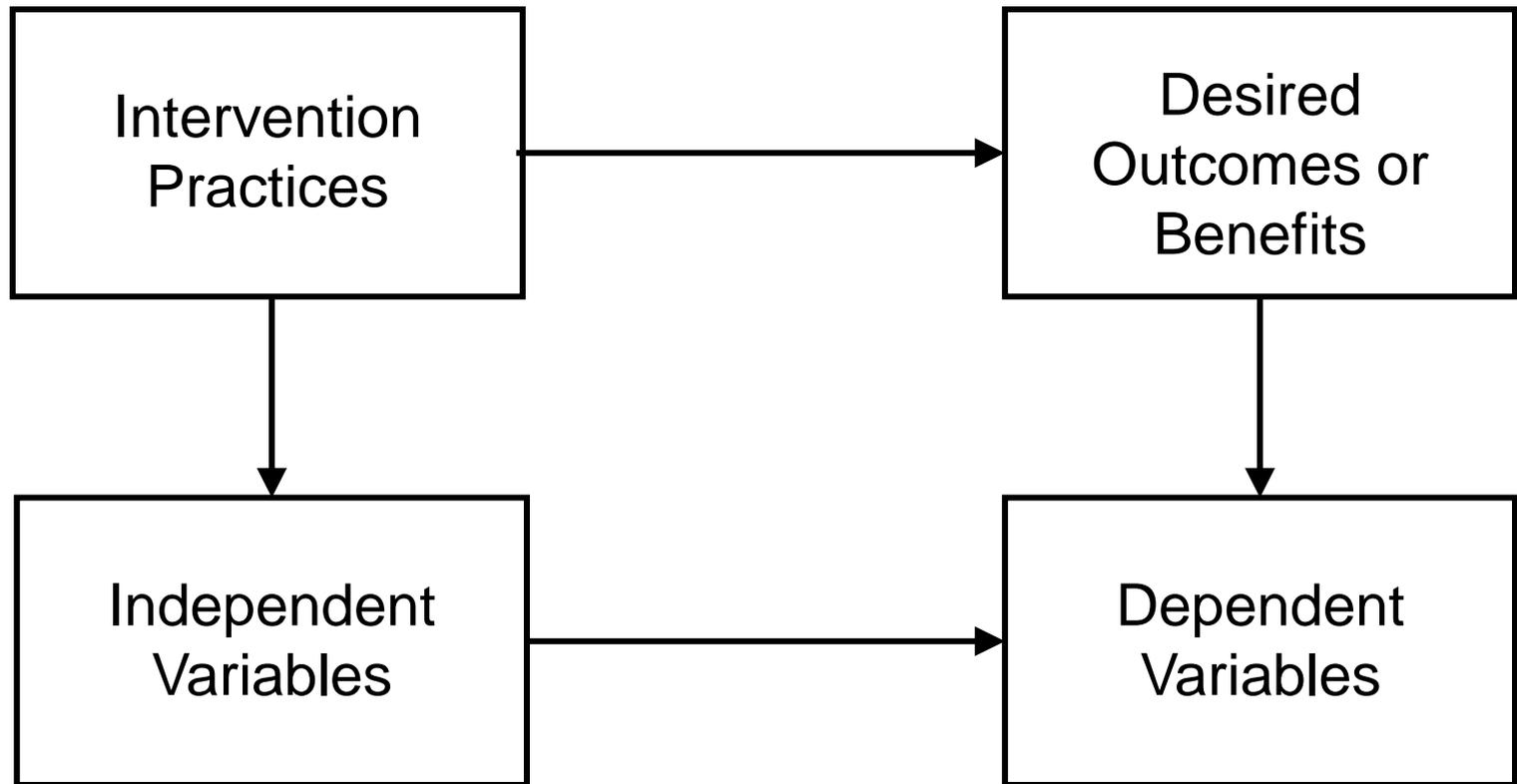
What Counts As Evidence?

- This depends on the purpose of a study or a research synthesis and the question that is being asked. This can include either or both quantitative and qualitative studies, observed or latent measures, etc.
- No a priori assumptions are made about the type of research design that is considered the “gold standard.” Different research designs are like different tools: You pick the right tool for the right job.
- Some measure of the size of effect between intervention variables and outcomes of interest, either in a single study or in a research synthesis, is the type of information needed to identify evidence-based practices.

What is an Intervention Practice?

Either an intentionally planned or naturally occurring experience, learning opportunity, or activity that includes specified characteristics, key features, or active ingredients that are associated with observable changes, improvements, or differences in outcomes of interest

Relationships for Investigating Early Childhood Intervention Practices



Key Characteristics of Intervention Practices

- Any type of early childhood intervention practice can be unpacked or unbundled in terms of key characteristics where certain characteristics are more important than others in terms of their relationships with child, parent, or other kinds of outcomes
- Studies of the relationships between the key characteristics of intervention practices and outcomes of interest are the sources of practice-based research evidence

A Word on Terminology in Applied Research

Independent Variables

Variables (practices) that can be manipulated, changed, or altered to determine if they have observable effects

Moderating Variables

Variables that explain the differential effects of intervention (independent) variables on outcomes of interest

Mediating Variables

Variables that explain the relationship between intervention and outcome variables

Types of Research Studies in Early Childhood Intervention

- Group Design Studies
- Single Subject Studies
- Correlational Studies
- Case Studies

Group Design Studies

Group design studies are typically described as experimental, quasi-experimental, or pre-experimental investigations. These include, but are not limited to:

- Intervention vs. Nonintervention Studies
- Intervention A vs. Intervention B Studies
- Pretest vs. Posttest Studies

Example of a Group Design Study

Efficacy Trial of Contrasting Approaches to the Response-Contingent Learning of Young Children with Significant Developmental Delays and Multiple Disabilities

- Randomized controlled design study comparing the relative effectiveness of two contrasting approaches to early contingency learning
- Asset-based vs. deficit-based approach to early contingency learning
- 71 children with significant developmental delays and multiple disabilities

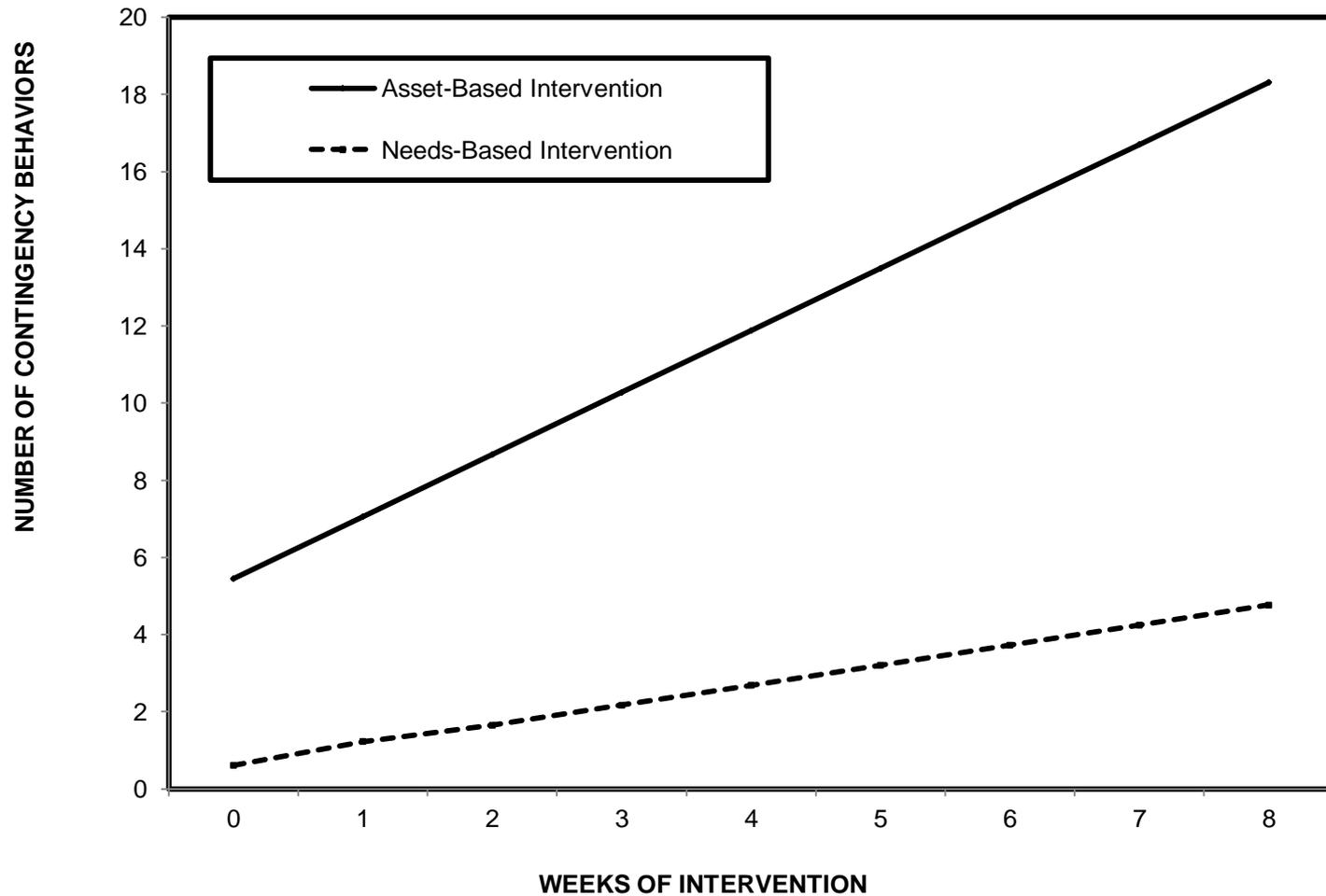
Raab, M., Dunst, C. J., & Hamby, D. W. (2017). Efficacy trial of contrasting approaches to the response-contingent learning of young children with significant developmental delays and multiple disabilities. *Journal of Educational and Developmental Psychology*, 7(1), 12-28.

Linear Growth Curve Average Rates of Change for the Contrasting Types of Interventions

Child Learning Measures	Asset Group		Needs Group		<i>d</i>	Improvement Index
	Average Slope	SE	Average Slope	SE		
Child Learning Opportunities						
Number of Learning Games	0.33	0.04	0.46	0.05	0.81	29
Number of Learning Trials Per Game	1.94	0.23	1.09	0.25	1.13	37
Child Response-Contingent (RC) Behavior						
Number of RC Behavior	5.60	0.53	1.67	0.57	1.45	43
Number of RC Behavior Per Game	1.73	0.20	0.49	0.21	1.48	43
Child Learning Efficiency						
Percent of Trials with RC Behavior	8.70	0.93	4.99	1.00	0.86	31
Average RC Behavior Per Minute	0.34	0.08	0.06	0.08	4.87	50

NOTES. The average slopes are adjusted for the two non-time varying covariates (child DQ and parent education). The Cohen's *d* effect sizes for the Table 3 contrasts were used to compute the improvement indices (Neill, 2006).

Average Number of Child Response-Contingent Behavior Per Game



Single Subject Design Studies

Single subject or single participant design studies involve ongoing data collection of behavior under pre-intervention conditions (baseline) compared to behavior after interventions are introduced to establish the effectiveness of the interventions

- Baseline, Intervention, Return to Baseline (ABA) Studies
- Multiple Baseline Design Across Children Studies
- Multiple Baseline Design Across Behavior Studies
- Multiple Baseline Design Across Setting Studies

Early Contingency Learning and Child Concomitant Social-Emotional Behavior

- Contingency learning games for promoting children's acquisition of instrumental behavior
- Multiple-baseline design across study participants
- Measured increases in the children's use of instrumental behavior used to produce interesting consequences or reinforcing events

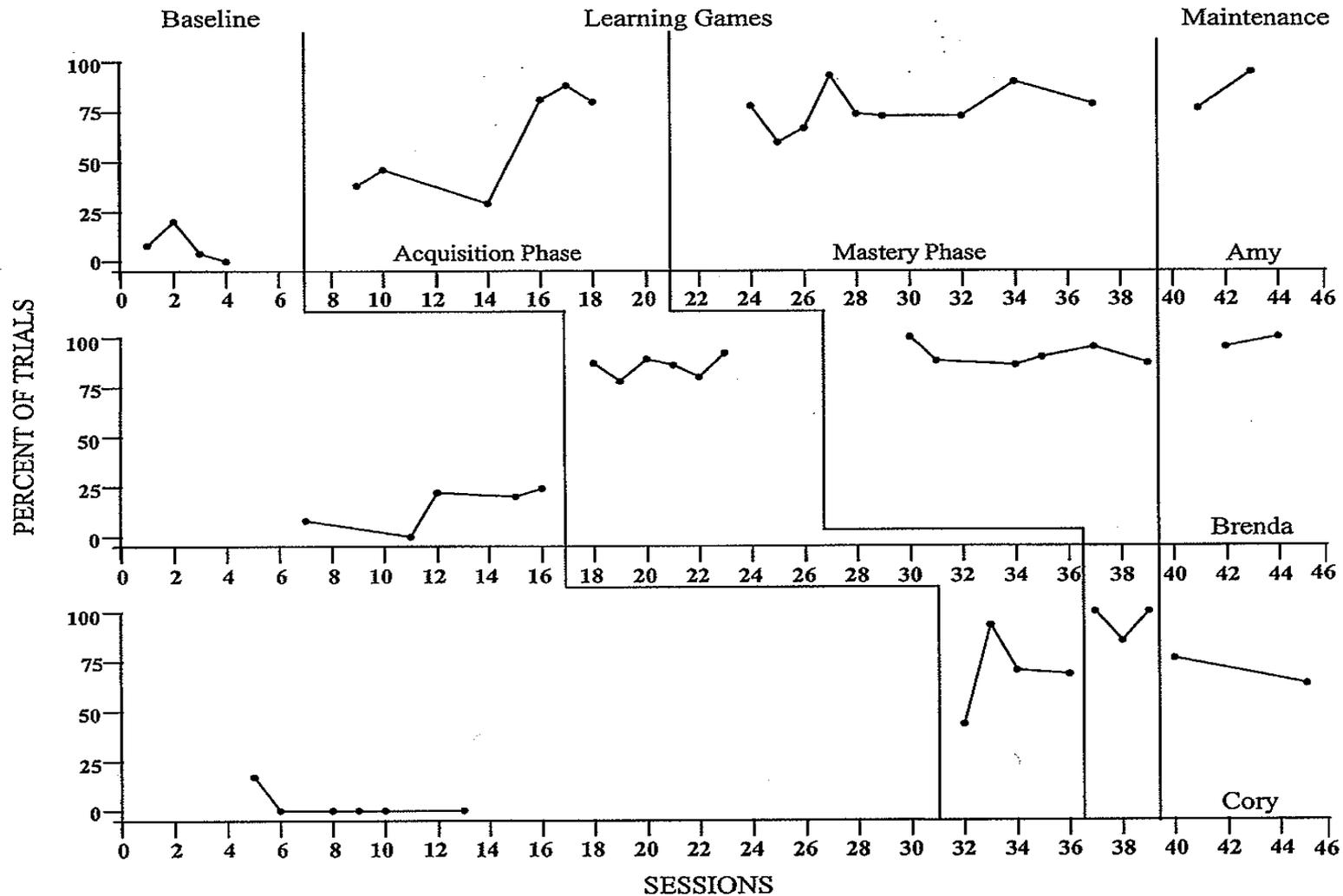
Raab, M., Dunst, C.J. Wilson, L.L., & Parkey C. (2009). Early contingency learning and child and teacher concomitant social-emotional behavior. *International Journal of Early Childhood Special Education*, 1(1), 1 – 14.

Characteristics of the Study Participants

Child	Chronological Age (Months)	Developmental Age (Months)	Development Quotient	Diagnosis ^a		
				CP	VI	Seizures
"Amy"	34	5	16	✓	✓	
"Brenda"	48	4	9	✓	✓	
"Cory"	52	3	6	✓		✓

^a CP = Cerebral palsy, VI = Visual impairment.

Child Production of Response-Contingent Behavior During the Different Phases of the Study



Correlational Studies

Correlational studies involve analyses of the relationships between variations in intervention variables with variations in outcome variables of interest to establish the nature of the relationships among variables

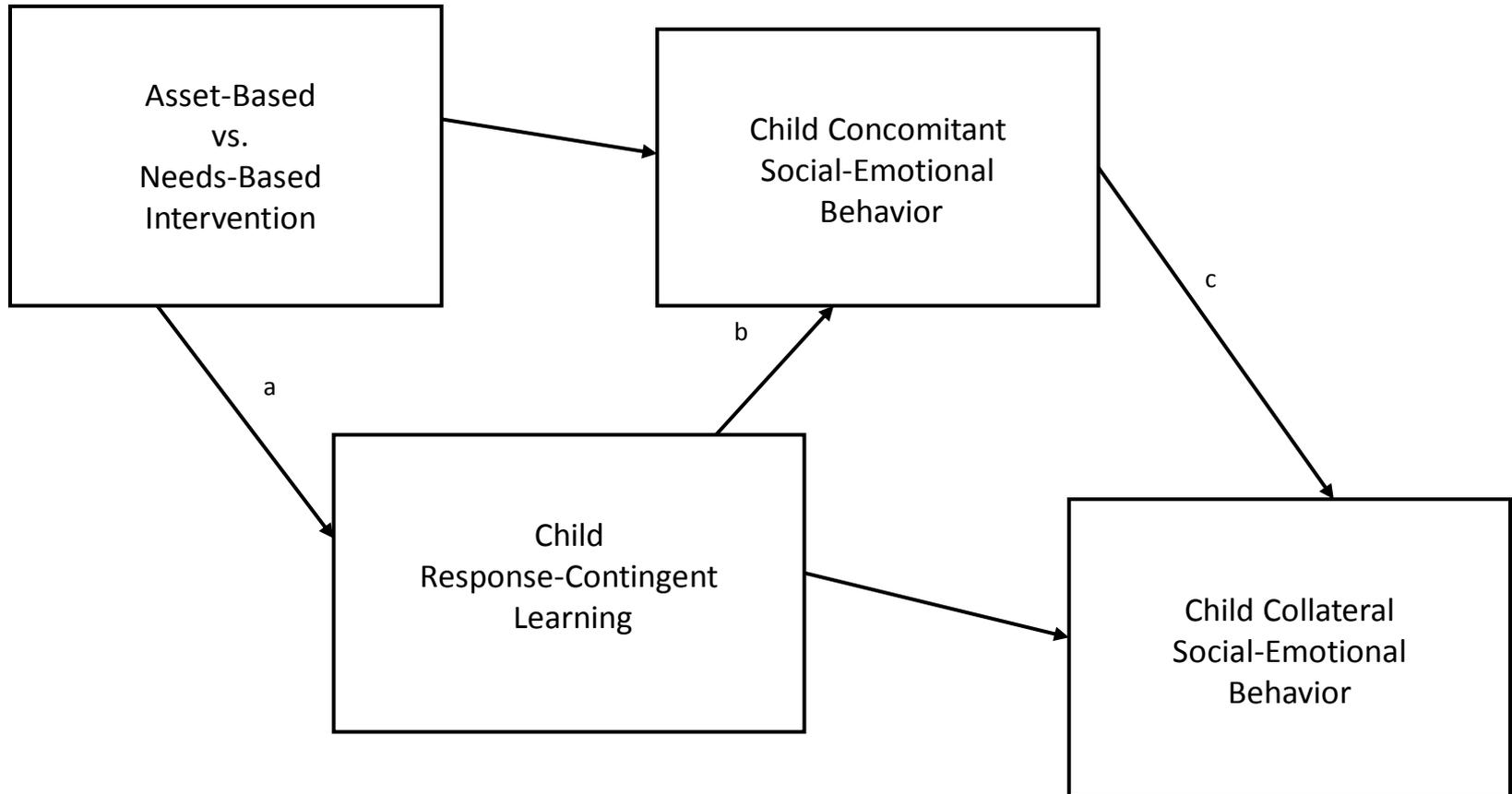
- Correlations Between Intervention and Outcome Variable Studies
- Multiple Regression Analysis Studies
- Structural Equation Modeling Studies

Relationship Between Child Contingency Learning and Social-Emotional Responding

- Observational study of the relationship between contrasting approaches to early contingency learning and child social-emotional behavior
- Asset-based vs. deficit-based approach to early contingency learning
- 71 children with significant developmental delays and multiple disabilities

Dunst, C. J., Raab, M., & Hamby, D. W. (2017). Contrasting approaches to the response-contingent learning of young children with significant delays and their social-emotional consequences. *Research in Developmental Disabilities, 63*, 67-73.

Hypothesized Pathways of the Relationships Among the Variables in the Model Guiding Data Analysis



Correlation Between Type of Intervention and Slopes for the Child Learning and the Concomitant and Collateral Child Social-Emotional Behavior Measures

Study Measures	Study Measures			
	NUM	GAM	CON	COL
Type of Intervention ^a	.52***	.45***	.39**	.04
Child Learning Measures				
Number of RC ^b Behavior (NUM)	-	.89***	.56***	.32**
RC Behavior Per Game (GAM)		-	.52***	.26*
Concomitant Child SE ^c Behavior (CON)			-	.57**
Collateral Child SE Behavior (COL)				-

NOTES. ^aAsset-based = 1, Needs-based = 0.

^bRC = Response-contingent child behavior.

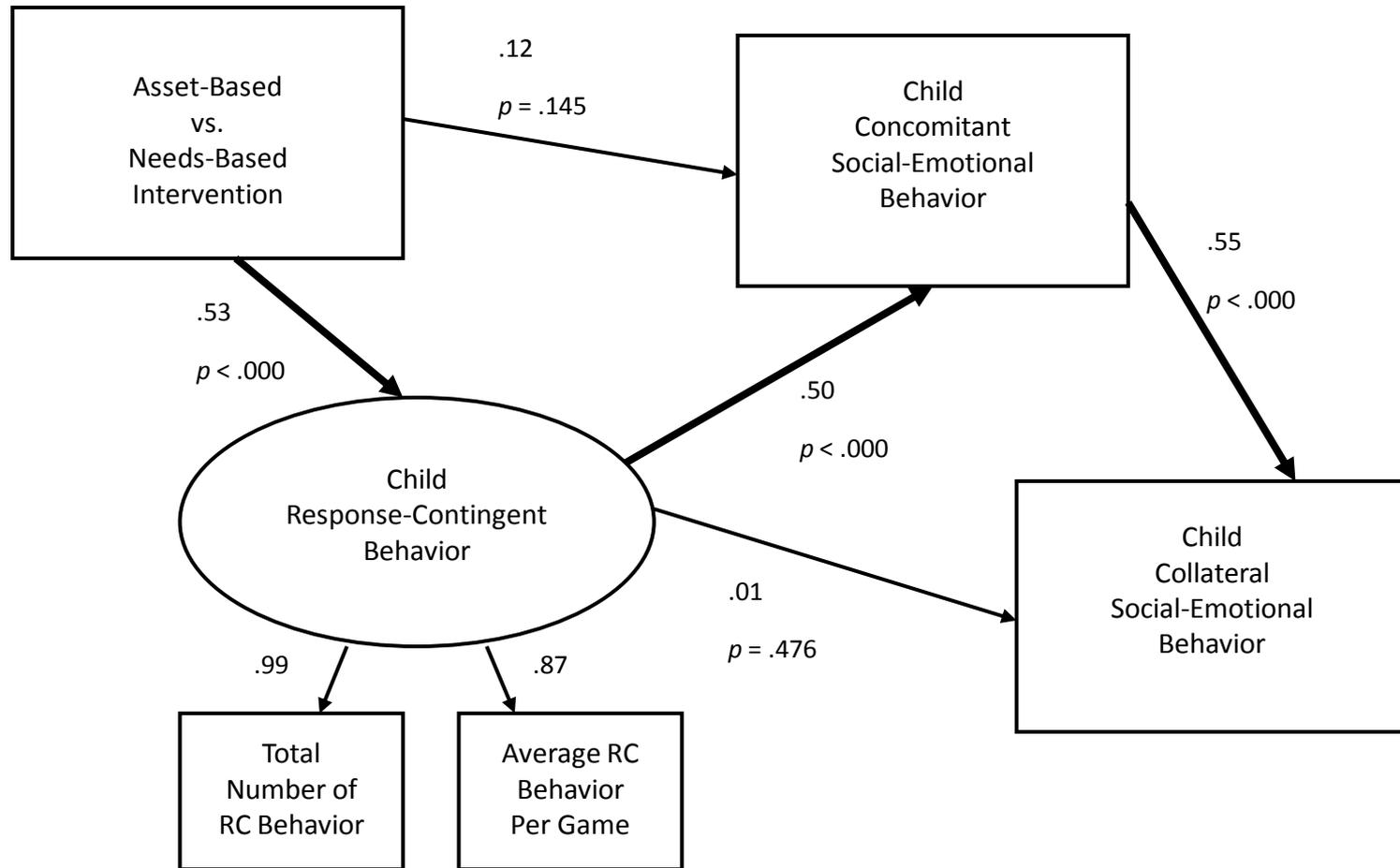
^cSE = Social-emotional child behavior.

* $p < .02$.

** $p < .01$.

*** $p < .000$.

Structural Equation Modeling Results and the Standardized Structural Coefficients for the Model Pathways



Case Study Research

Case study research involves collection of information about intervention processes and outcomes of interest to establish the effects or influences of the interventions on the outcome

- Exploratory Studies
- Explanatory Studies

Key Features of Case Study Research Studies

- Pattern Matching Consists of matching an observed pattern of information (data) with a hypothesized pattern to determine if the data supports the hypothesis
- Replication Involves tests for both literal replication (the same pattern is associated with the same outcome) and theoretical replication (a different pattern is associated with a different outcome)

Examples of Case Study Research Investigations

Dunst, C. J., Trivette, C. M., Davis, M., & Cornwell, J. (1988). Enabling and empowering families of children with health impairments. *Children's Health Care, 17*, 71-81.

Dunst, C. J. (2015). Professional-family relationships in family support programs. *International Journal of Case Studies, 4*(9), 23-31.

Dunst, C. J., & Hamby, D. W. (2015). A case study approach to secondary reanalysis of a quantitative research synthesis of adult learning practices studies. *International Journal of Learning, Teaching and Educational Research, 13*(3), 181-191.

Case Studies of the Relationships Between Family-Centered Help Giving and Family Member Outcomes

- The purpose of the study described in this paper was to ascertain if family support coordinator practices that were consistent with the intent of family support principles were associated with hypothesized positive family member outcomes (literal replication) and those not consistent with the intent of family support principles were associated with hypothesized poorer or less desirable outcomes (theoretical replication).
- The participants were 11 family resource coordinators and 22 parents of a family member with a developmental disability in 11 United States.
- An investigator-developed interview protocol was used to obtain adult family member descriptions of family resource coordinator practices and the outcomes associated with the practices.

Dunst, C. J. (2015). Professional-family relationships in family support programs. *International Journal of Case Studies*, 4(9), 23-31.

Pattern Matching Results for the Relationships Between Family Resource Coordinator Practices and Family Reported Outcomes

Family Resource Coordinator Practices	Family Outcomes				
	Highly positive outcomes	Mostly positive outcomes	Neither positive nor negative outcomes	Mostly negative outcomes	Highly negative outcomes
Highly consistent with family support principles	11	27	2	1	0
Mostly consistent with family support principles	10	42	6	0	0
Neither consistent nor inconsistent with family support principles	1	6	1	1	0
Mostly inconsistent with family support principles	0	1	0	6	1
Highly inconsistent with family support principles	0	0	0	11	9

Evidence-Based Early Childhood Intervention Practices

- The same intervention practice-outcome relationship is repeated (replicated) in different studies of the same practice again, and again, and again...
- The extent to which replication is established is the foundation for claiming an intervention practice is evidence-based
- One objective of a research synthesis is determining how many intervention practice-outcome relationships have been found in the same kinds of studies

Research Syntheses of Intervention Studies

A research synthesis includes “methods for summarizing, integrating, and where possible, culminating the findings of different studies on a topic or research question” (Davies, 2000, p. 367)

Types of Research Syntheses

- Narrative Reviews
- Summative Reviews
- Systematic Reviews
- Meta-Analyses

Narrative Reviews

- Narrative, or traditional literature reviews, attempt to identify what has been written on a subject or topic, using which methodologies, on what samples or populations, and what findings
- Narrative reviews typically include descriptive summaries of the results from primary studies and interpretive statements about the nature of the relationships between an intervention practice and outcome variables of interest

Summative Reviews

- Summative reviews are similar to narrative reviews but include some type(s) of quantification, often in terms of the number of studies according to types of intervention, settings, research designs, study participants, or some other relevant intervention or study feature

Systematic Reviews

- Systematic reviews are research syntheses in which there is a comprehensive search for relevant studies on a specific topic, and those identified are then appraised and synthesized according to a predetermined explicit method
- These types of research syntheses use a systematic approach for determining the types of studies to be included in a review, the search strategy to identify relevant studies, the methods to appraise the quality of identified studies, the methods for analyzing results, and the methods for establishing intervention effects

Meta-Analyses

- A meta-analysis is a particular type of systematic review where effect sizes are used for assessing the relationship between a practice and outcome, where the combined effect size results from a series of studies are used to estimate the average effect of a practice
- Research syntheses that use meta-analytic methods rely on the statistical analysis of study results as the basis for synthesizing and interpreting findings from studies of the same or similar practices
- An effect size is a measure of the strength of the relationship between two variables expressed in terms of a quantitative metric

Framework for Categorizing Research Syntheses

TYPE OF RESEARCH SYNTHESSES

Meta-Analyses				
Systematic Reviews				
Summative Reviews				
Narrative Reviews				
	Group	Single Subject	Correlational	Case Study

TYPE OF STUDY

A Practice-Based Approach to Conducting Research Syntheses

- Practice-based research syntheses focus on ***unpacking***, ***disentangling***, and ***unbundling*** an intervention to isolate those practice characteristics that “matter most” in terms of explaining the results found in different studies of the same or similar interventions.
- Practice-based research syntheses can be used to examine any one of four types of studies (group, single subject, correlational, case) and be synthesized using any of the four types of research syntheses (narrative, summative, systematic, meta-analysis)

Examples of Practice-Based Research Syntheses

Effects of Adult Verbal and Vocal Contingent Responsiveness on Increases in Infant Vocalizations^a

Carl J. Dunst

Ellen Gorman

Deborah W. Hamby

Number of Studies: 22 studies including 214 infants and toddlers (15 studies of typically developing infants and 6 studies of infants and toddlers with disabilities)

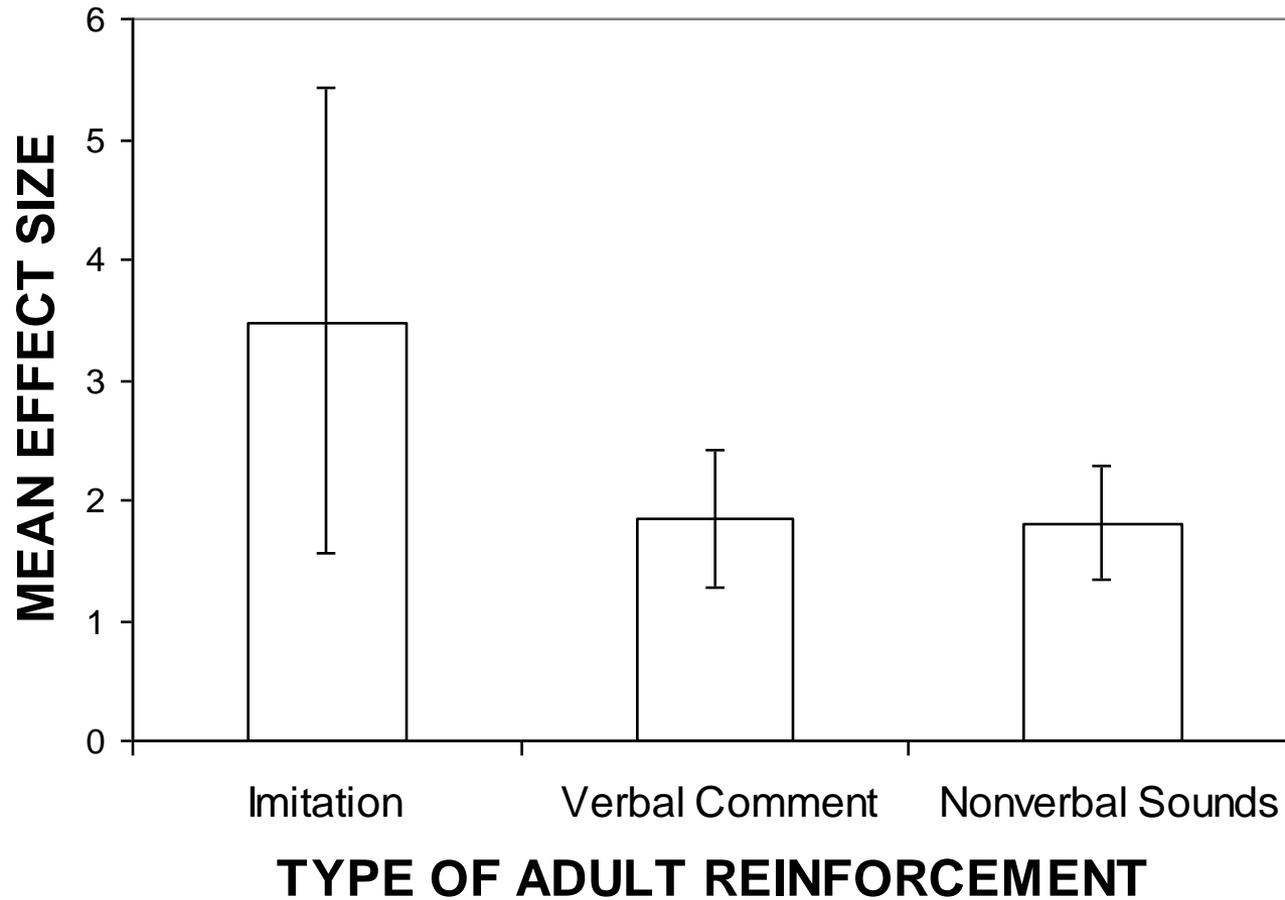
Research Designs: Baseline (A) vs. intervention (B), ABA, and ABAB single participant or group design studies

Adult Reinforcement: Imitation of child vocalizations, verbal comments (e.g., “good girl”) or pre-determined vocal sounds (“tsk,tsk, tsk”)

Size of Effect: Cohen’s *d* effect size for the difference between the baseline vs. experimental study conditions

^a *CELLreviews*, 2010, Vol. 3, No. 1 (Available at www.earlyliteracylearning.org)

Relative Effectiveness of Three Types of Adult Reinforcement on Infant Vocalizations



Caregiver Sensitivity, Contingent Social Responsiveness, and Secure Infant Attachment^a

Carl J. Dunst

Danielle Kassow

Number of Studies: 75 studies including more than 4500 parent-child dyads

Research Design: Observational studies of parent-child interactions that included measures of child attachment (mostly the Stranger Situation)

Caregiver Sensitivity: Explicit and implicit measures of caregiver contingent social responsiveness and sensitivity

Size of Effect: Cohen's *d* effect size for the relationship between caregiver behavior and secure infant attachment

^a *Journal of Early and Intensive Behaviour Intervention*, 2008, 5(1), 40-56.

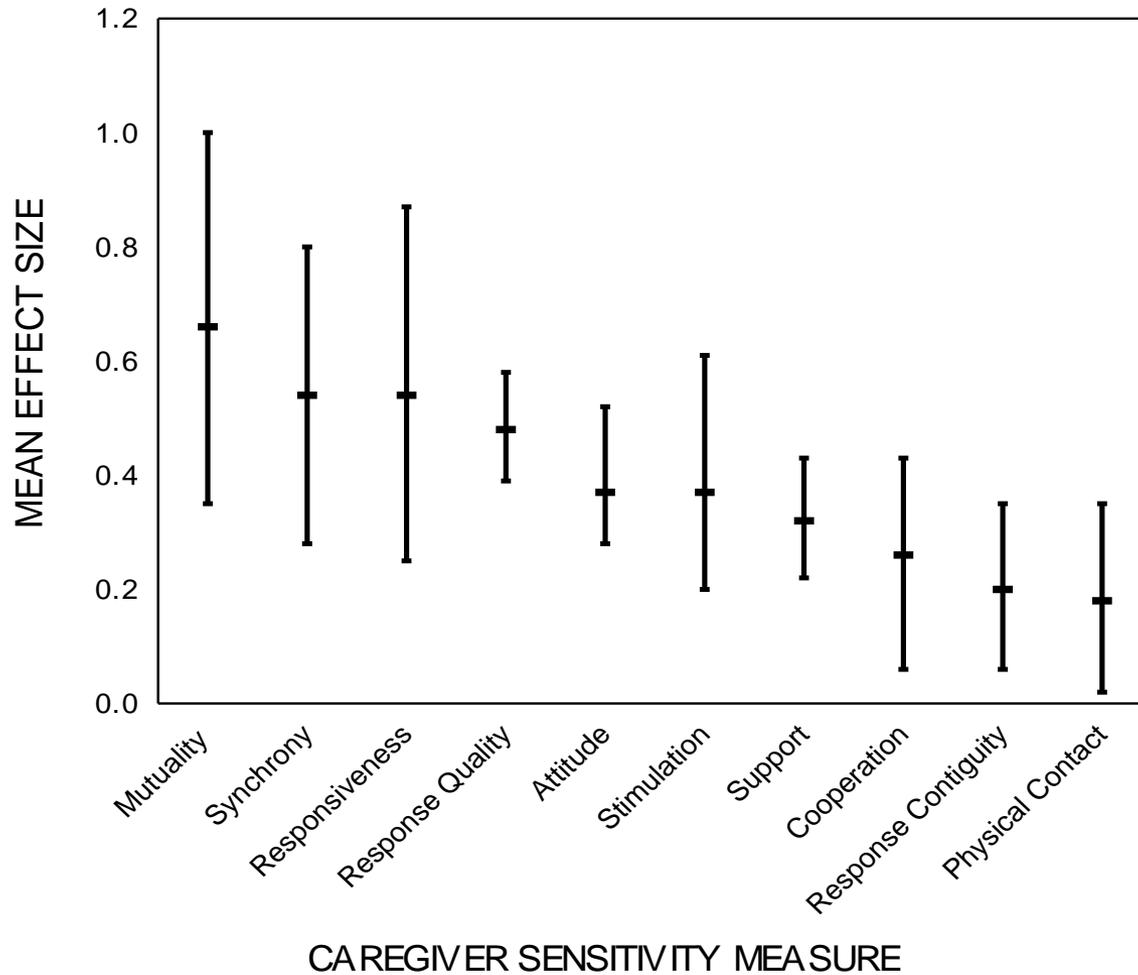
Explicit Measures of Caregiver Sensitivity Behavior

Caregiver Sensitivity Behavior	Definition
Caregiver/Child Synchrony	Synchrony is characterized by caregiver-child interactions that are reciprocal and rewarding to both the caregiver and child (Isabella, Belsky, and von Eye, 1989).
Caregiver/Child Mutuality	Mutuality is characterized by positive caregiver-infant interactions where both the caregiver and child are attending to the same thing simultaneously.
Response Quality	Caregiver response quality is characterized by a caregiver's ability to perceive infant signals accurately, interpret signals accurately, and respond to signals promptly and appropriately (Ainsworth, Bell, & Strayton, 1974; Ainsworth, Blehar, Waters & Wall, 1978).
Responsiveness	Caregiver responsiveness is characterized by a caregiver's response to the infant's behavior where the response functions as a reinforcement maintaining or sustaining infant behavior directed toward the adult (Gewirtz, 1991).
Response Contiguity	Caregiver response contiguity is characterized by a caregiver's promptness and frequency or rate of response to the infant's signals (DeWolf & van Ijzendoorn, 1997).

Implicit Measures of Caregiver Sensitivity Behavior

Caregiver Sensitivity Behavior	Definition
Physical Contact	Caregiver physical contact is characterized by a caregiver's quality and quantity of physical contact with the infant (DeWolf & van Ijzendoorn, 1997).
Cooperation	Caregiver cooperation is characterized by a caregiver's presence or absence of intrusive or interfering behaviors toward the infant whether the caregiver respects the infant's autonomy, if the caregiver avoids interrupting the infant's activities or demonstrates skill when interruption is necessary, and/or does not exert direct control over the infant (Ainsworth et al., 1974).
Support	Caregiver support is characterized by caregiver attentiveness and availability, supportiveness of the infant's efforts, providing a secure base for the infant, and being involved with the infant by attending to both the infant and the task at which both parties are engaged (Matas et al., 1978).
Positive Attitude	Caregiver positive attitude is characterized by the caregiver's expression of positive affect, warmth, empathy, and affection toward the infant (Zaslow, Rabinovich, Suwalsky, & Klein, 1988).
Stimulation	Caregiver stimulation is characterized by any caregiver action toward the infant (Miyake, Chen, & Campos, 1985). Stimulation typically includes caregiver encouragement, affective-stimulation, and stimulation/arousal of the infant.

Mean Cohen's *d* Effect Sizes and 95% Confidence Intervals for the Relationship Between the 10 Caregiver Sensitivity Measures and Secure Infant Attachment



Conclusions

- Different types of research syntheses yield different kinds of information (evidence) about the effects of different intervention approaches or practices
- Practice-based research syntheses yield information that can directly inform identification of the key characteristics of evidence-based practices
- The characteristics of evidence-based practices can also be used as standards against which practices can be evaluated in terms of the likelihood of being effective