Family-Systems Research in Early Childhood Intervention and Family Support

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Frameworks for practicing evidence-based early childhood intervention and family support. Lecture prepared for the "Knowledge-Based Family Intervention in Long-Term Illness and Disability" Course, Swedish Institute of Health Sciences, Lund University, Lund, Sweden, September 5, 2011.

Outline

A. Types of Studies
   1. Descriptive
   2. Meta-analysis
   3. Structural equation modelling
   4. Meta-analytic structural equation modelling

B. Examples of Family Systems Intervention Research
   1. Adherence to family-centred principles and practices
   2. Influences of family-centred practices on child, parent and family outcomes
   3. Mediating influences of different kinds of intervention practices
   4. Studies investigating paths of influence of early intervention variables on child and parent outcomes

Examples of Different Kinds of Family-Systems Research

- Measuring practitioner adherence to family-centred practices
- Meta-analyses of family-centred practices research
- Structural equation modelling of the influences of family-centred practices on family outcomes
- Meta-analytic structural equation modelling of early intervention practices on parent, parent-child and child outcomes

Measuring Adherence to Family-Centred Principles and Practices

- Adherence to family-centred principles and practices is measured in terms of program participant judgments of the extent to which program staff interact with and treat them and their family members in ways consistent with the intent of family support principles and practices

- Family-centred principles and practices are considered a ***behavioural promise*** and ***program guarantee*** that staff will treat families in ways consistent with the intent of the principles and practices

- A consumer sciences perspective was used to assess staff adherence to family support principles and practices where consumers (parents) were considered the primary source of evidence that program staff interacted and treated families in ways consistent with family-centred program principles and practices

Measuring Adherence to Family Support Principles

- In a typical adherence study or survey, program participants are asked to indicate on a 5-point scale ranging from ***never*** to ***always*** the extent to which staff treat or interact with the respondent and his or her family in the ways indicated
- A typical survey includes 5 or 6 family-centred relational indicators and 5 or 6 family-centred participatory indicators
- Percentage of indicators receiving the highest rating on a 5-point scale, indicating that a respondent and his or her family are ***always*** treated in the way consistent with the scale indicators, is used as the measure of adherence

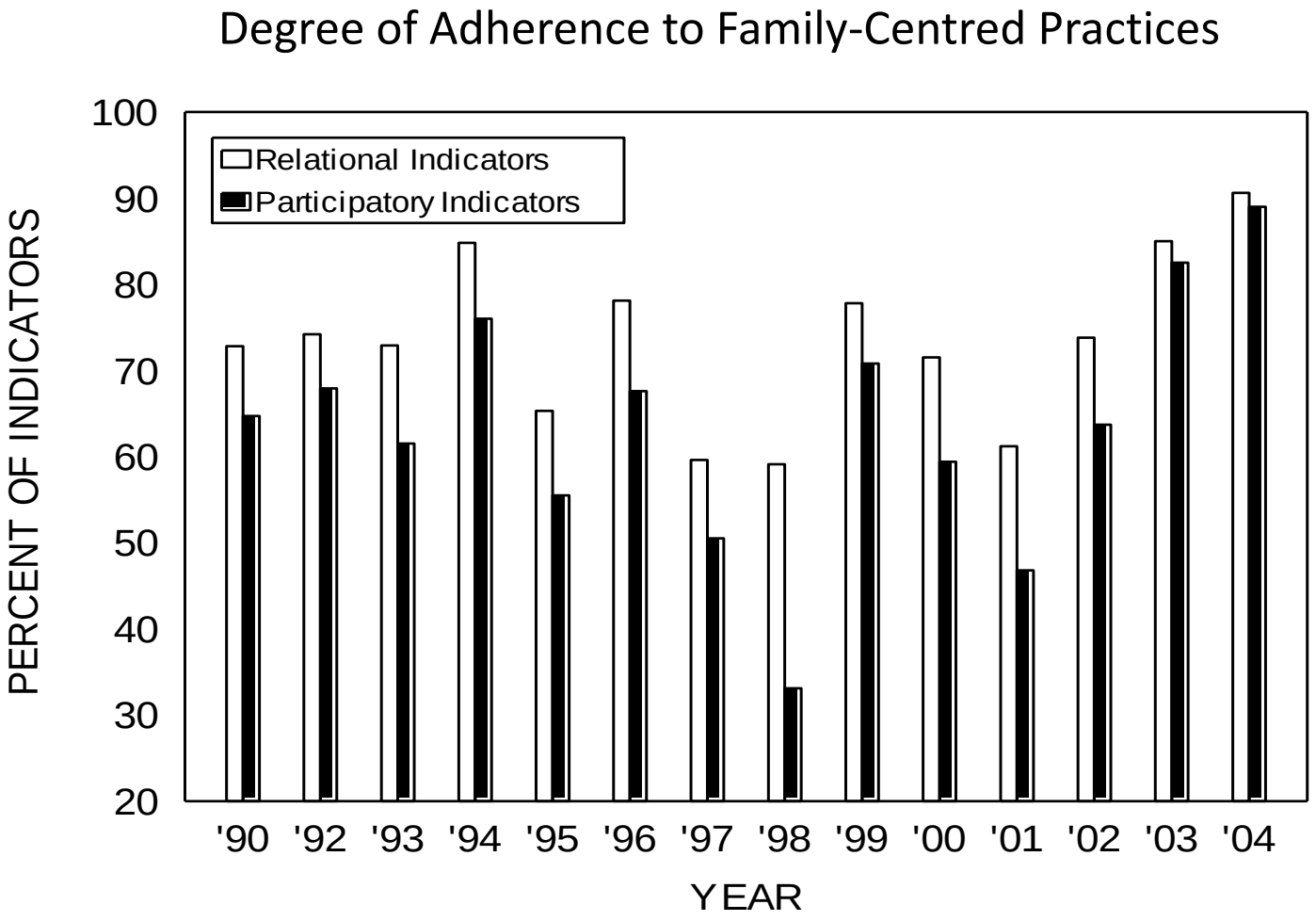
Example of a Family-Centred Practices Indicator Scale

EXPERIENCES WITH FAMILY RESOURCE CENTER STAFF					
Staff sometimes differ in how they interact with and treat children and their families. Please indicate how the ***Family Resource Centre*** staff interacts with and treats you.	Never	Very Little	Some of the Time	Most of the Time	Always
Really listen to my concerns or requests	1	2	3	4	5
See my child and family in a positive, healthy way	1	2	3	4	5
Provide me information I need to make good choices	1	2	3	4	5
Are responsive to my requests for advice or assistance	1	2	3	4	5
Try hard to understand my child and family's situation	1	2	3	4	5
Recognize my child and family's strengths	1	2	3	4	5
Help me be an active part of getting desired resources	1	2	3	4	5
Are flexible when my family's situation changes	1	2	3	4	5
Encourage me to get what I want for myself	1	2	3	4	5
Are sensitive to my personal beliefs	1	2	3	4	5
Support me when I make a decision	1	2	3	4	5
Recognize the good things I do as a parent	1	2	3	4	5

Sources of Information for Assessing Adherence to Family-Centred Practices

- Eighteen (18) studies conducted between 1990 and 2004 at the Family, Infant and Preschool Program (Morganton, NC, USA)
- One thousand ninety six (1096) program participants
- Thirteen thousand five hundred and eleven (13,511) family-centred relational and participatory practice indicators

[a] Dunst, C.J., & Trivette, C.M. (2005). *Measuring and evaluating family support program quality.* Winterberry Press Monograph Series. Asheville, NC: Winterberry Press.


Degree of Adherence to Family-Centred Practices
Relational Indicators
Participatory Indicators
PERCENT OF INDICATORS
100
90
80
70
60
50
40
30
20
'90
'92
'93
'94
'95
'96
'97
'98
'99
'00
'01
'02
'03
'04
YEAR

Meta-Analysis of Family-Centred Practices Research

Meta-analysis is a procedure for combining (integrating) findings from multiple studies investigating the same or a very similar intervention (independent) variable and the same or similar outcome (dependent) variables to determine the overall strength of the relationship between the two sets of measures. The size of effect for the relationship between measures provides an estimate of the effect of an intervention variable on an outcome variable. The average weighted effect size between measures for all studies combined is considered the best estimate of the relationship between measures.

Effect Sizes

Effect sizes rather than statistical significance are used to determine the strength of the relationships between independent and dependent variables in a meta-analysis. An effect size is a metric for quantifying the differences between groups on a dependent variable or for quantifying the relationship (covariation) between two variables. It is common practice to use standardized effect sizes because they mean the same thing in different studies. Two commonly used effect sizes are:

- Cohen's *d*
- Correlation coefficient

Two Families of Effect Sizes[a]

- Cohen's *d* Effect Sizes

  These effect sizes are used to determine the differences between two groups on an outcome measure where the two groups had different experiences (e.g., intervention group vs. control group).

- Correlation Effect Sizes

  These effect sizes are used to determine the strength of the relationship between two variables for the same group of individuals (e.g., the relationship between dosage of an intervention and amount of child progress).

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[a] R.L. Rosnow, R. Rosenthal, D.B. Rubin. (2000). Contrasts and correlations in effect-size estimation. *Psychological Science*, 446-453.

Research Syntheses of Family-Centred Help Giving Practices

- Meta-analysis of 52 studies conducted by more than 20 researchers and research teams in seven countries[a,b]

- Meta-analysis of 18 studies conducted in one early childhood intervention and family support program[c]

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[a] Dunst et al. (2007). Meta-analysis of family-centered help-giving practices research. *Mental Retardation and Developmental Disabilities Research Reviews*, 13, 370-378.

[b] Dunst et al. (2008). *Research synthesis and meta-analysis of studies of family centred practices*. Winterberry Press Monograph Series. Asheville, NC: Winterberry Press.

[c] Dunst et al. (2006). *Family support program quality and parent, family and child benefits*. Winterberry Press Monograph Series. Asheville, NC: Winterberry Press.

Meta-Analysis of Family-Centred Help-giving Practices Research[a]

Family-Centred Practices

Relational and participatory family-centred practices measured by 12 different family-centred practices scales

Studies

47 studies conducted in 7 countries (N=11,187 study participants)

Outcomes

Program helpfulness, self-efficacy beliefs, social support, child behaviour functioning, parent and family well-being, and parenting competence and confidence

Measure of Effect Size

Correlation coefficient for the relationship between relational and participatory practices and the study outcomes. The average weighted correlations for all studies combined were used as the best estimate of the size of effect between measures.

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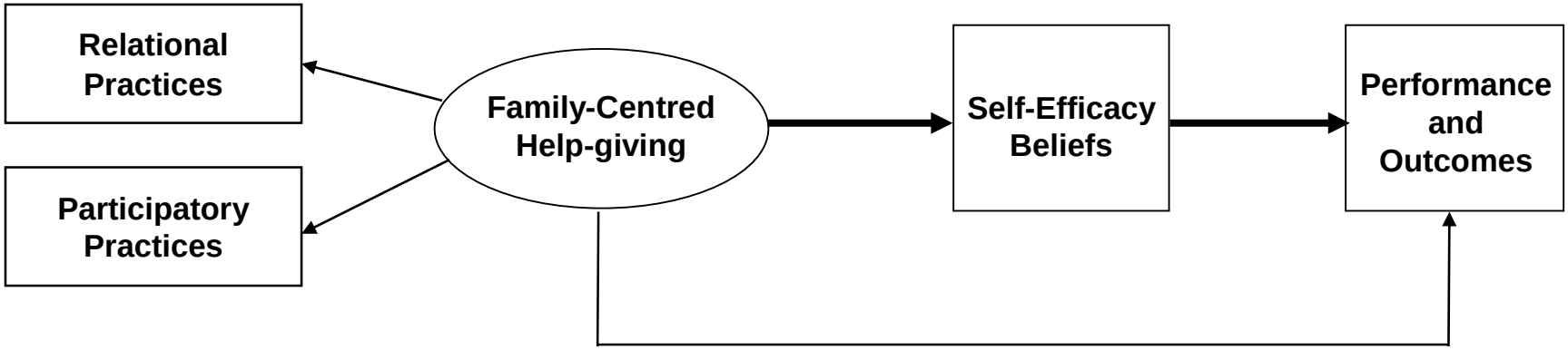
[a] Dunst, C.J., Trivette, C.M., & Hamby, D.W. (2007). Meta-analysis of family-centered help giving practices research. *Mental Retardation and Developmental Disabilities Research Reviews*, 13, 370-378.

Model for Evaluating the Relationships Among Family-Centred Practices, Self-Efficacy Beliefs and Program Participant Outcomes

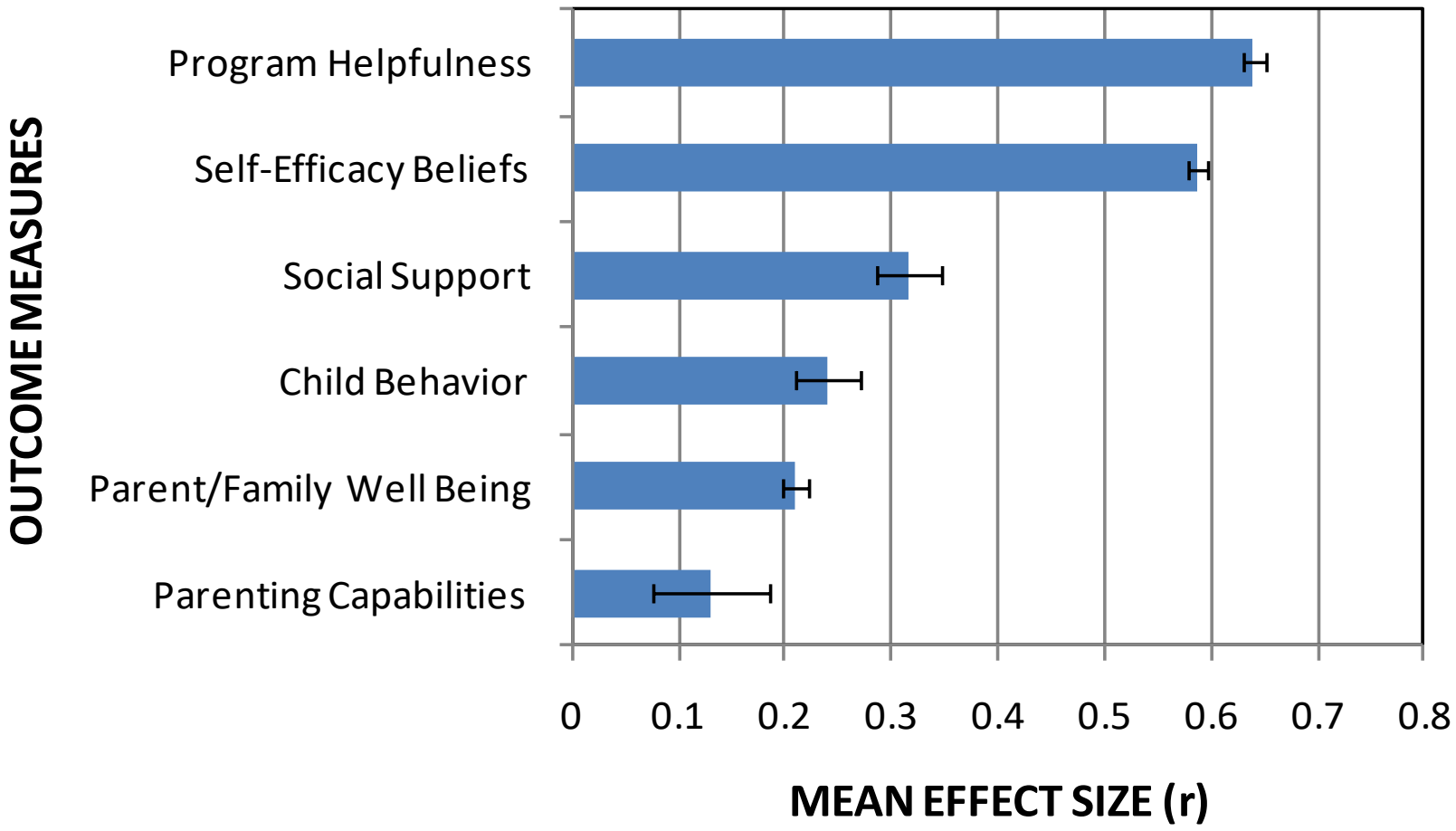


Effect Sizes for the Relationship Between Relational and Participatory Practices and the Outcomes Measures

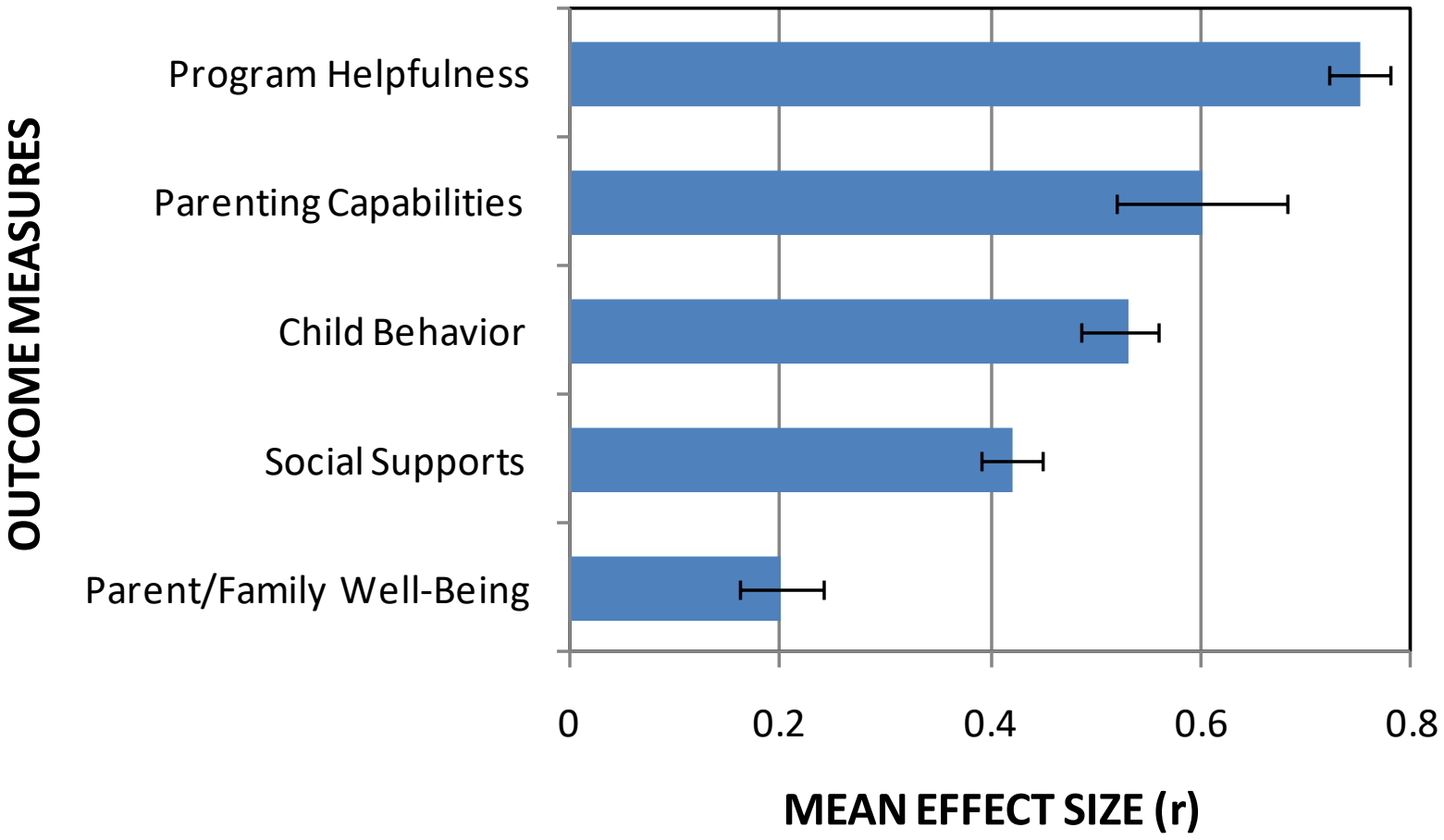
	Relational Practices				Participatory Practices			
	Number		Effect Size[a]		Number		Effect Size[a]	
Outcome Measures	Sample Size	Effect Size	Mean	95% CI	Sample Size	Effect Size	Mean	95 % CI
Participant Satisfaction								
Satisfaction with Staff	601	4	.67****	.63-.72	526	5	.38****	.34-.42
Satisfaction with Program	1598	20	.63****	.62-.65	1598	8	.67****	.65-.70
Self Efficacy Beliefs								
Practitioner Control	1368	10	.62****	.59-.65	1368	11	.62****	.59-.66
Program Control	754	10	.70****	.66-.73	754	13	.67****	.64-.70
Life Events Control	675	12	.32****	.26-.38	913	19	.39****	.35-.43
Program Resources								
Parent/Child Supports	181	4	.26****	.17-.36	181	4	.37****	.28-.46
Program Helpfulness	252	2	.47****	.37-.56	252	2	.52****	.43-.61
Child Behaviour								
Positive Child Behaviour	345	8	.25****	.19-.31	345	5	.34****	.27-.41
Negative Child Behaviour	93	8	.25****	.18-.31	93	4	.20****	.11-.30
Behavioural Competence	252	3	.24****	.14-.34	252	3	.18***	.08-.28
Well-Being								
Personal Well-Being	1543	26	.27****	.25-.30	1543	16	.26****	.22-.30
Family Well-Being	245	4	.18****	.11-.27	245	4	.29****	.23-.37
Parenting Behavior								
Confidence	331	3	.16**	.06-.27	331	4	.26****	.18-.35
Competence	236	2	.05	-.07-.18	236	3	.11*	.01-.21
Enjoyment	331	3	.15**	.05-.26	331	4	.24****	.16-.35

*p < .05. **p < .01. ***p < .001. ****p < .0001.

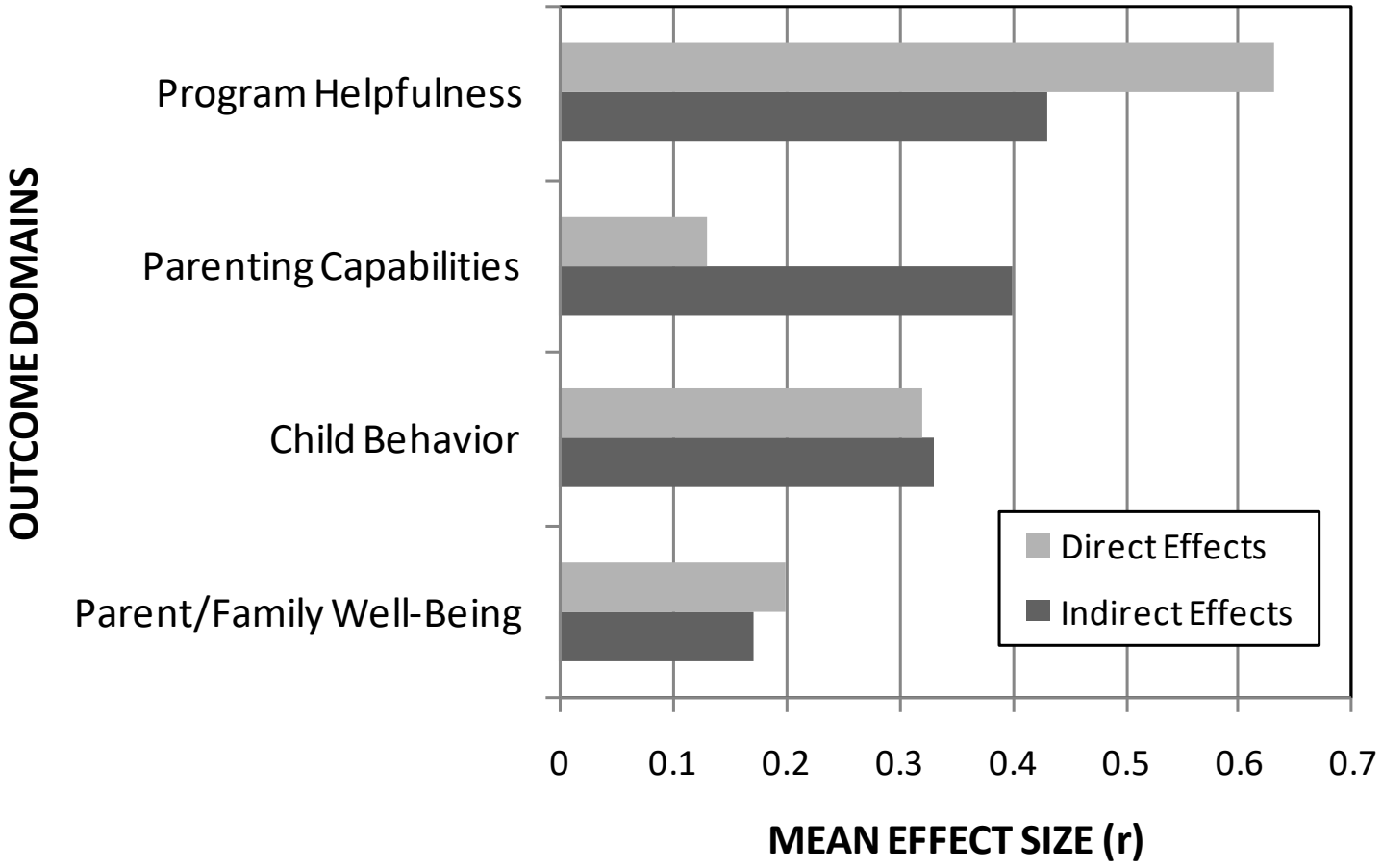
Direct Effects of Family-Centred Practices on
Parent, Family, and Child Behaviour and Functioning

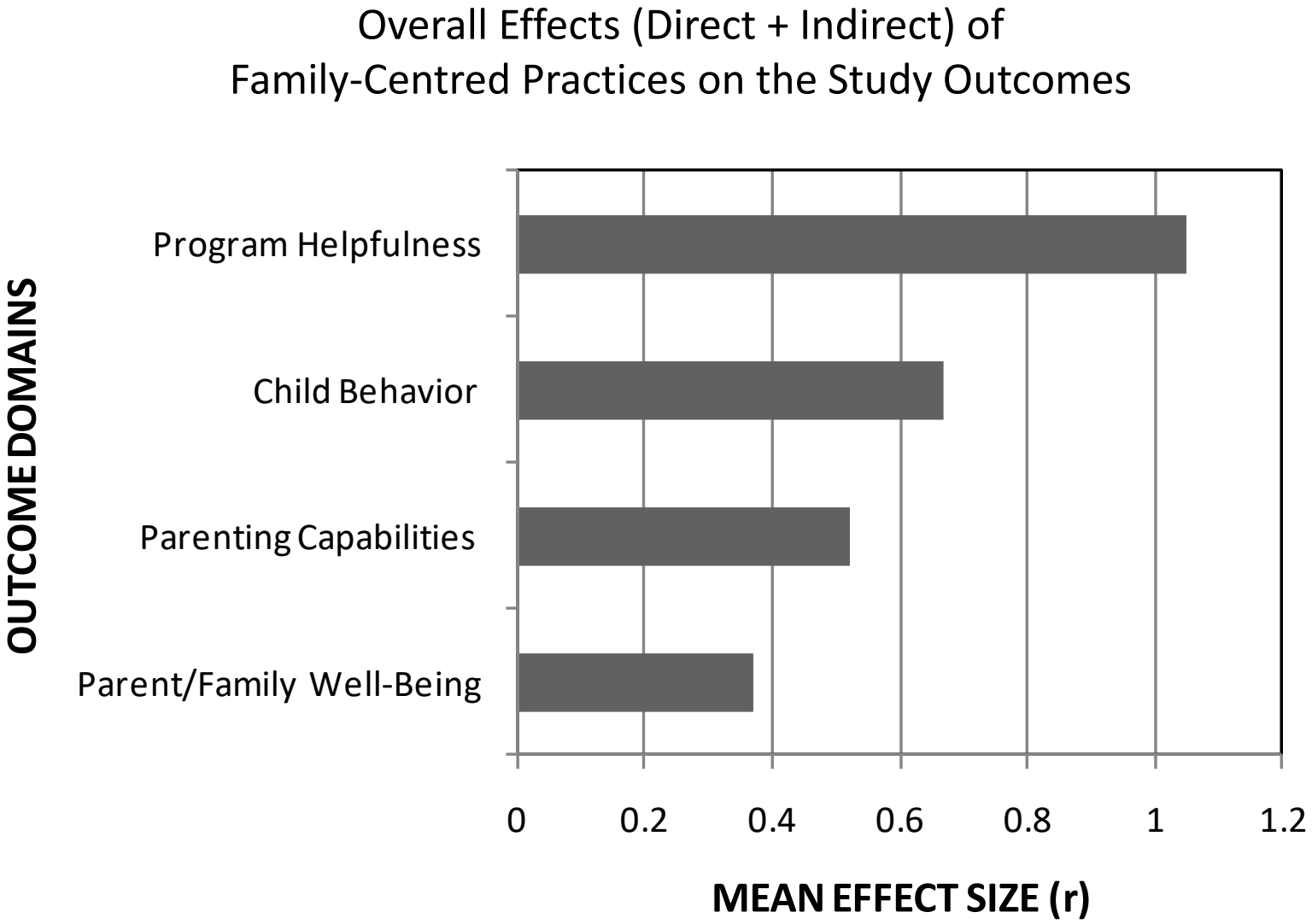


Direct Effects of Self-Efficacy Beliefs on
Parent, Family, and Child Behaviour and Functioning



Direct and Indirect Effects of Family-Centred Practices on the Study Outcomes




Overall Effects (Direct + Indirect) of
Family-Centred Practices on the Study Outcomes
OUTCOME DOMAINS
Program Helpfulness
Child Behavior
Parenting Capabilities
Parent/Family Well-Being
0
0.2
0.4
0.6
0.8
1
1.2
MEAN EFFECT SIZE (r)

Structural Equation Modelling Studies

A procedure for evaluating how a set of variables are related to one another in terms of causes and effects (i.e., pathways of influence). Structural equation modelling tests the fit of a proposed or hypothesized model to the pattern of relationships (e.g., correlations) among the variables in the model. Path diagrams are used to show how the variables in a model "go together." How well the model fits the data is assessed by fit indices which tell us whether the model is accepted or rejected. Two of the many fit indices are:

- Comparative fit index (CFI). The closer CFI is to 1.0, the better the fit.
- Root mean square error of approximation (RMSEA). The closer RMSEA is to zero, the better the fit.

Parent and Community Assets as Sources of Young Children's Learning Opportunities[a]

Participants: 100 low income mothers and their preschool age child(ren) in five low income housing neighbourhoods

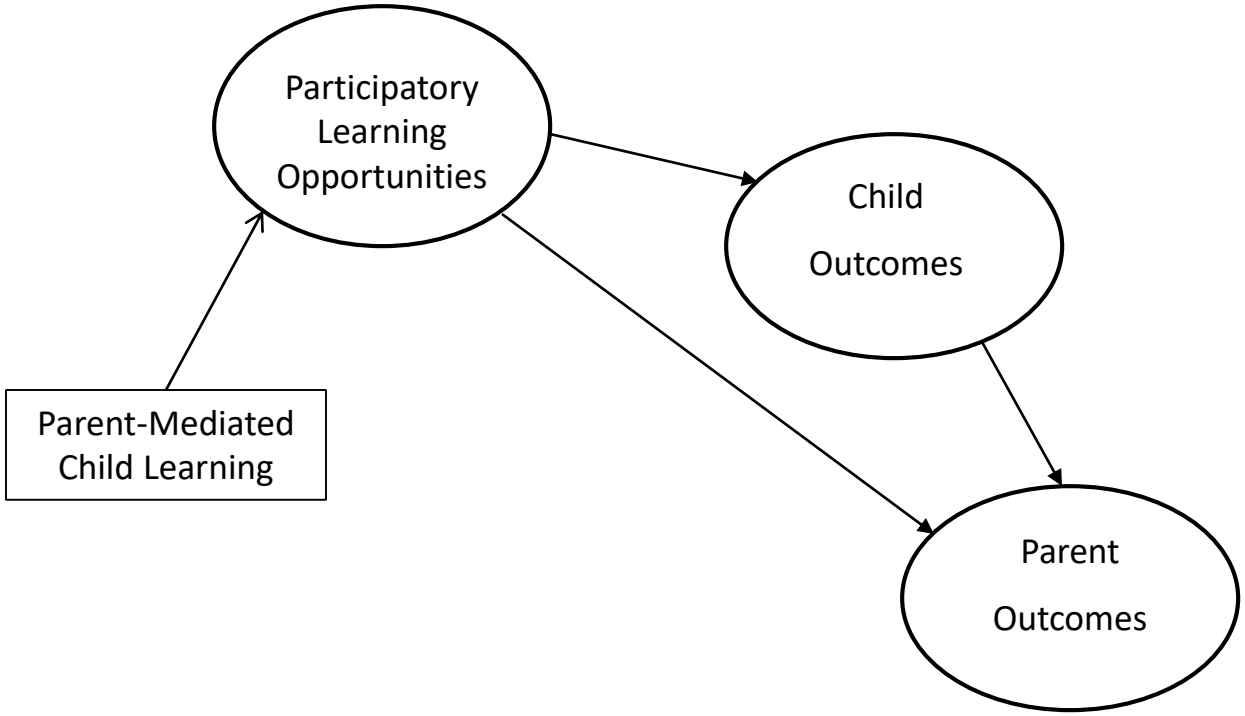
Intervention: Number and frequency of child and parent-child participatory learning opportunities

Outcomes: Child engagement and positive affect and parent confidence and enjoyment in providing her child(ren) informal family and community learning opportunities

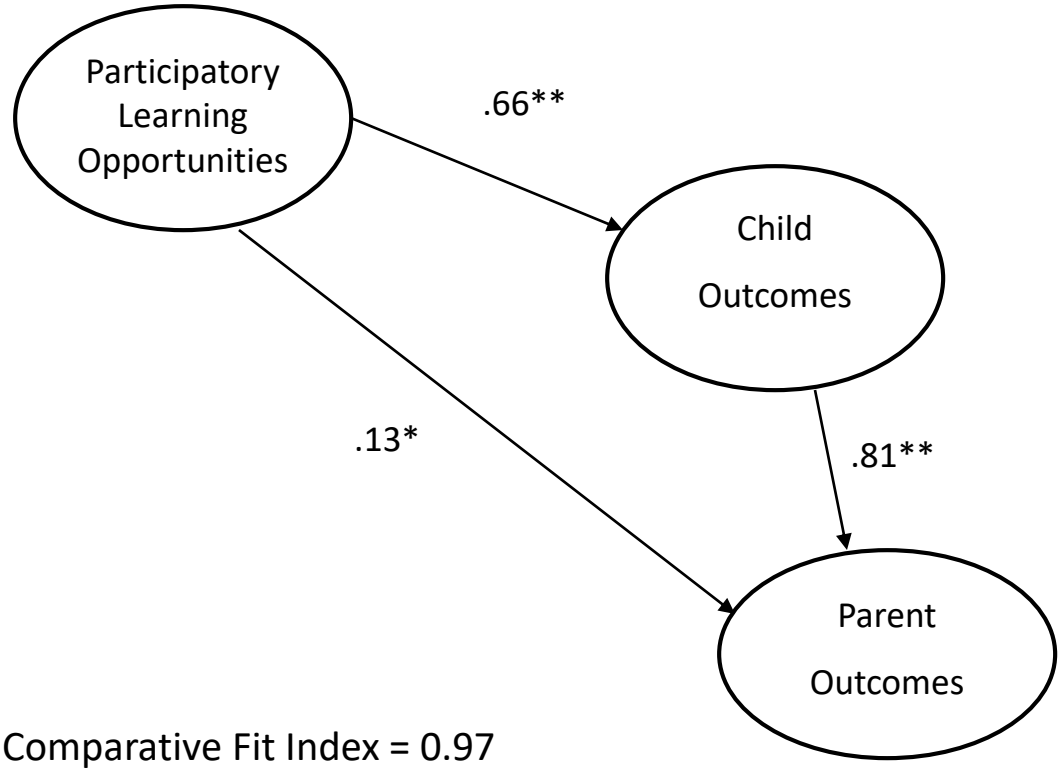
Predictions: Parents who successfully engaged their children in the learning activities would have positive outcomes on both the children and parents where the relationship between the participatory learning opportunities and parent outcomes was mediated by child benefits

[a] Dunst, C.J. (2008). *Parent and community assets as sources of young children's learning opportunities* (Revised and expanded ed.) Asheville, NC: Winterberry Press.

Path Diagram for the Relationships Among the Measures in the Model



Structural Equation Modelling Results



Effects Decomposition

Direct = .13

Indirect = .53

Total = .66

Comparative Fit Index = 0.97

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* $p < .06$. ** $p < .0001$.

Effects of Early Childhood Intervention Variables on Parent and Family Well-Being

Purpose

Evaluate the influences of family-centred practices and different structural intervention variables on parent and family well-being

Participants

250 parents and young children with developmental disabilities or delays involved in 59 different early childhood intervention programs

Measures

Family-centred practices, different early intervention program variables, self-efficacy beliefs, family socioeconomic status, and parent and family well-being

Method of Analysis

Structural equation modelling and effects decomposition to identify the direct and indirect effects of early intervention on parent and family functioning

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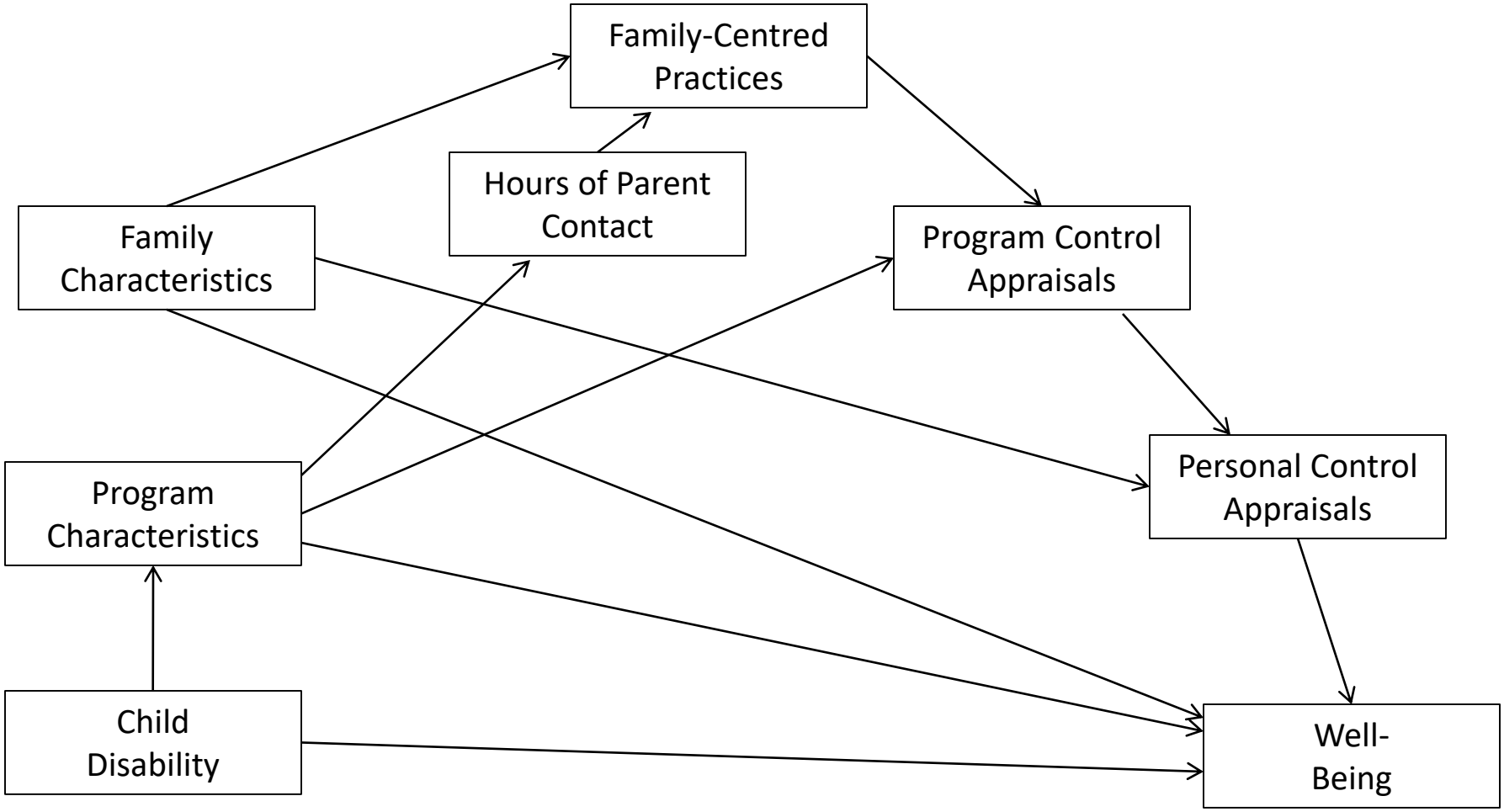
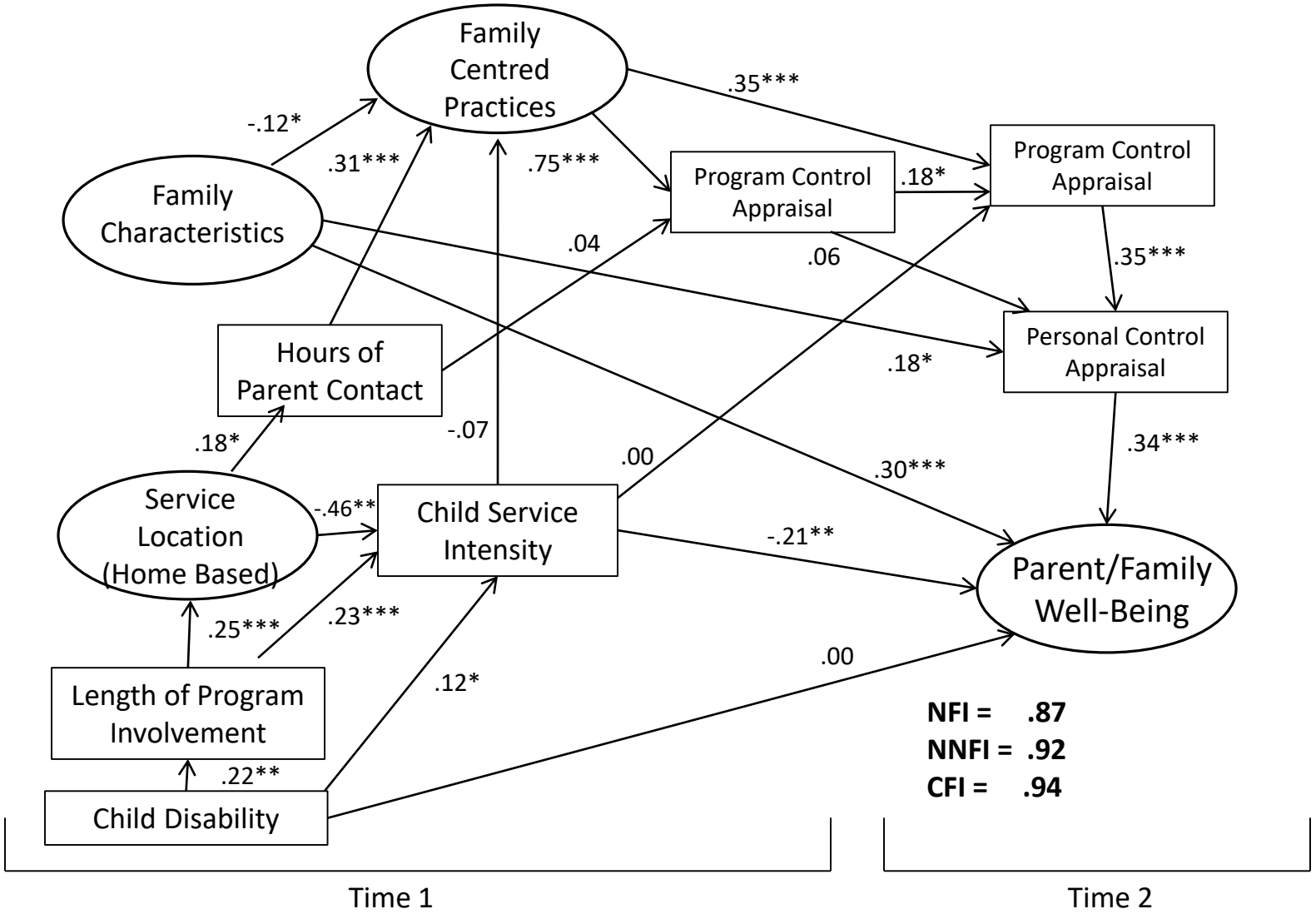
Dunst, C.J., Hamby, D.W., & Brookfield, J. (2007). Modeling the effects of early childhood intervention variables on parent and family well-being. *Journal of Applied Quantitative Methods*, 2, 268 – 288.

Hypothesized Relationships Among Program and Person Variables and their Influences on Psychological Well-Being



Structural Equation Modelling Result



*p < .05, **p < .01, ***p < .001, ****p < .0001.

Selected Effects Decomposition Results

Measures		Effects Decomposition		
Predictor	Criterion	Direct	Indirect	Total
Service Intensity	Program Control (T1)	-	-.05	-.05
	Program Control (T2)	.00	-.03	-.03
	Personal Control	-	-.02	-.02
	Well-Being	- .21**	-.02	-.23**
Family-Centred Practices	Program Control (T1)	.75****	-	.75****
	Program Control (T2)	.35***	.14*	.49***
	Personal Control	-	.21**	.21**
	Well-Being	-	.07	.07
Program Control (T1)	Program Control (T2)	.18*	-	.18*
	Personal Control	.06	.06	.12*
	Well-Being	-	.04	.04
Program Control (T2)	Personal Control	.35***	-	.35***
	Well-Being	-	.12*	.12*
Personal Control	Well-Being	.34***	-	.34***

NOTE: T1 = Time 1 and T2 = Time 2.

*p < .05. **p < .01. ***p < .001. ****p < .0001.

Meta-Analytic Structural Equation Modelling Studies

Meta-analytic structural equation modelling (MASEM) is a procedure for combining data (e.g., correlations) from multiple studies (meta-analysis) and using the combined data set to evaluate the fit of a model to the patterns of relationships among the variables in the model (structural equation modelling). Recent advances in data analysis procedures make meta-analytic structural equation modelling potentially useful for evaluating the effects of different kinds of intervention practices on outcomes of interest. Dr. Mike Cheung at the National University of Singapore has developed easy to use software[a] to prepare and analyze data to perform a MASEM.

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[a] Cheung, M.W.L. (2009). TSSEM: A LISREL syntax generator for two-stage structural equation modeling (Version 1.11) [Computer software manual]. Singapore: Author. Available at http://courses.nus.edu.sg/coursepsycwlm/internet/tssem.zip.

Two-Stage Structural Equation Modelling

Stage 1.Test the homogeneity of a pooled correlation matrix and produce a weighted pooled correlation matrix. This involves two steps:

1A. Testing the homogeneity of a pooled matrix

1B. Producing a weighted correlation matrix if the pooled matrix is homogeneous

Stage 2. Testing the fit of a hypothesized model to the patterns of relationships among the variables in the pooled matrix using SEM. Two types of statistics are used to evaluate fit:

2A. Testing the fit of a model to the patterns of correlations among the variables in the model

2B. Estimate the strength of the relationships between the variables in a model

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[a]Cheung, M.W., & Chan, W. (2005). Meta-analytic structural equation modeling: A two-stage approach. *Psychological Methods*, 10(1), 40-64.

Stage 1A: Pooling Correlation Matrices

	Study 1		Study 2		Study 3		Pooled	
Variable 1	1.0		1.0		1.0		1.0	
Variable 2	.62	1.0	.49	1.0	-	-	.55	1.0
Variable 3	.33	.51 1.0	.37	.42 1.0	.42	- 1.0	.37	.46 1.0
Variable 4	.41	.32 .38 1.0	.45	.23 .27 1.0	.33	- .30 1.0	.40	.29 .32 1.0
			+		+		=	

The pooled correlation matrix is first evaluated to determine if the correlations among the measures in different studies are homogeneous

Stage 1B: Produce a Weighted Pooled Correlation Matrix

A weighted pooled correlation matrix adjusts the size of the correlations between variables by giving more weight to studies with larger sample sizes.

- If the correlations for large N studies are smaller than those for small N studies, the pooled correlations will be ***smaller*** than the average correlation
- If the correlations for large N studies are larger than those for small N studies, the pooled correlations will be ***larger*** than the average correlation

Stage 2A: Testing Model Fit

Model fit is used to assess “how well” the hypothesized model fits the overall relationships between the variables in a pooled correlation matrix. Different fit indices are available for this test. The recommended fit indices for two-stage meta-analytic structural equation modelling are:

- Comparative fit index
- Root mean square error of approximation

Stage 2B: Sizes of Effects in the Structural Equation Model

This step produces the effect sizes (parameter estimates) for each of the paths in a model. You can use either standardized or nonstandardized path coefficients as the sizes of effect. Standardized effect sizes can range between -1 and +1. I prefer standardized coefficients for several reasons:

- Measures of the same construct are generally not scaled the same in different studies
- All effect sizes can be interpreted in the same manner

Influences of Family-Centred Help-Giving on Parenting Confidence, Competence and Enjoyment

Studies

Eight studies that all included measures of family-centred practices, self-efficacy beliefs, and parenting confidence, competence and enjoyment

Sample

N = 934 participants

Family-Centred Practices Measures

Family-Centred Practices Scale and Enabling Practices Scale

Self-Efficacy Beliefs

Control appraisals of the ability to obtain the information and guidance, and supports and resources, from early intervention program staff

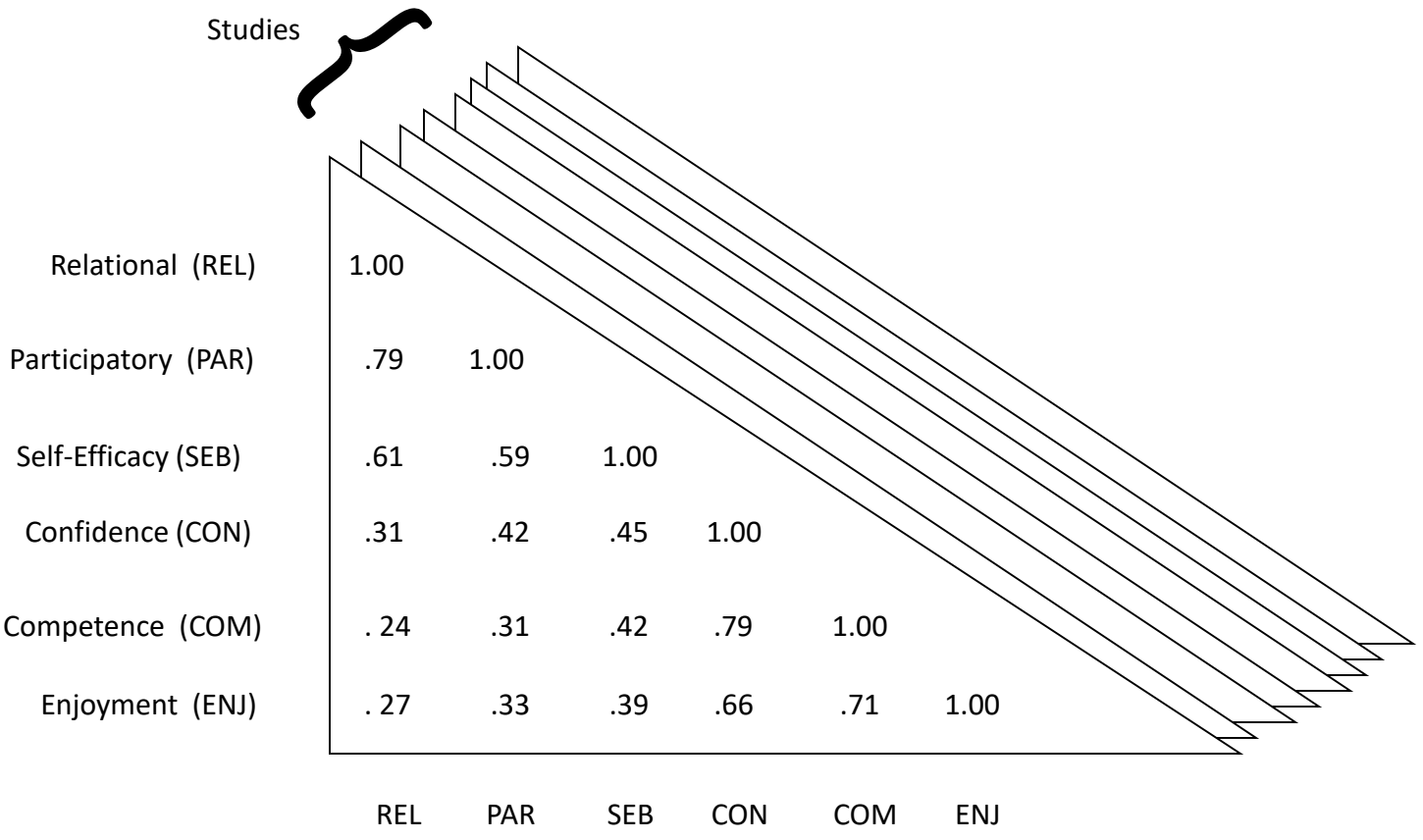
Parenting Capabilities

Everyday Parenting Scale measuring parent confidence, competence and enjoyment

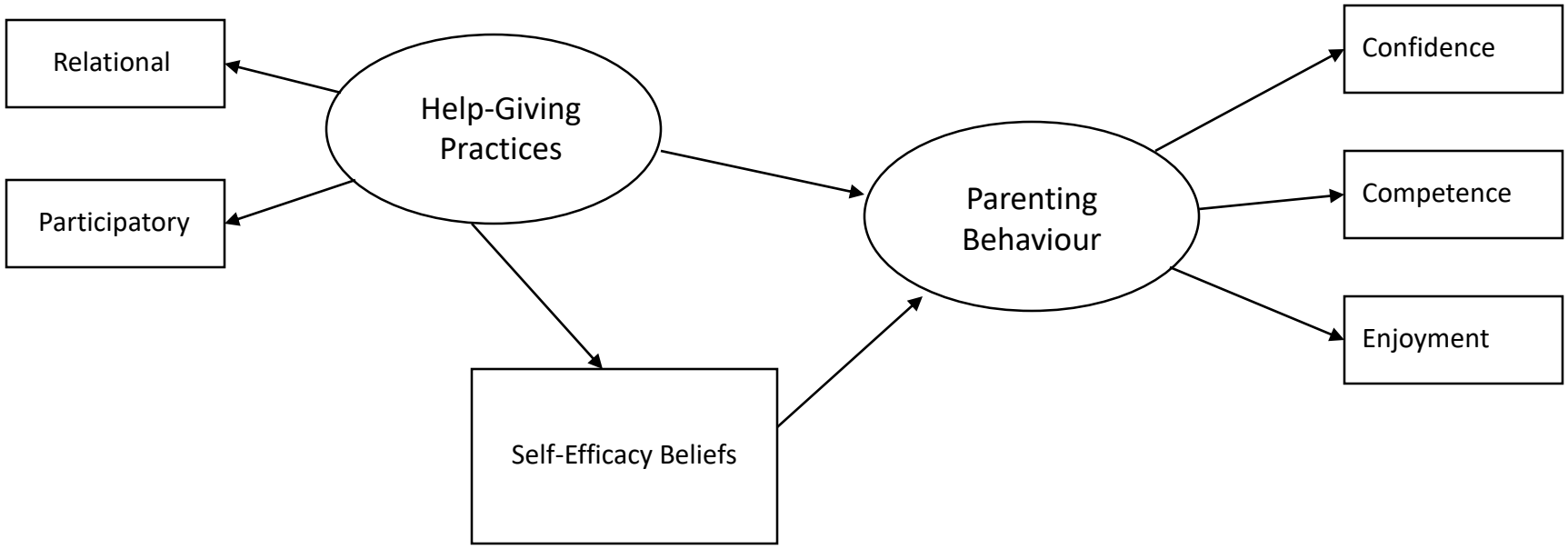
Hypothesis

Family-centred practices would be indirectly related to parenting confidence, competence and enjoyment mediated by self-efficacy beliefs

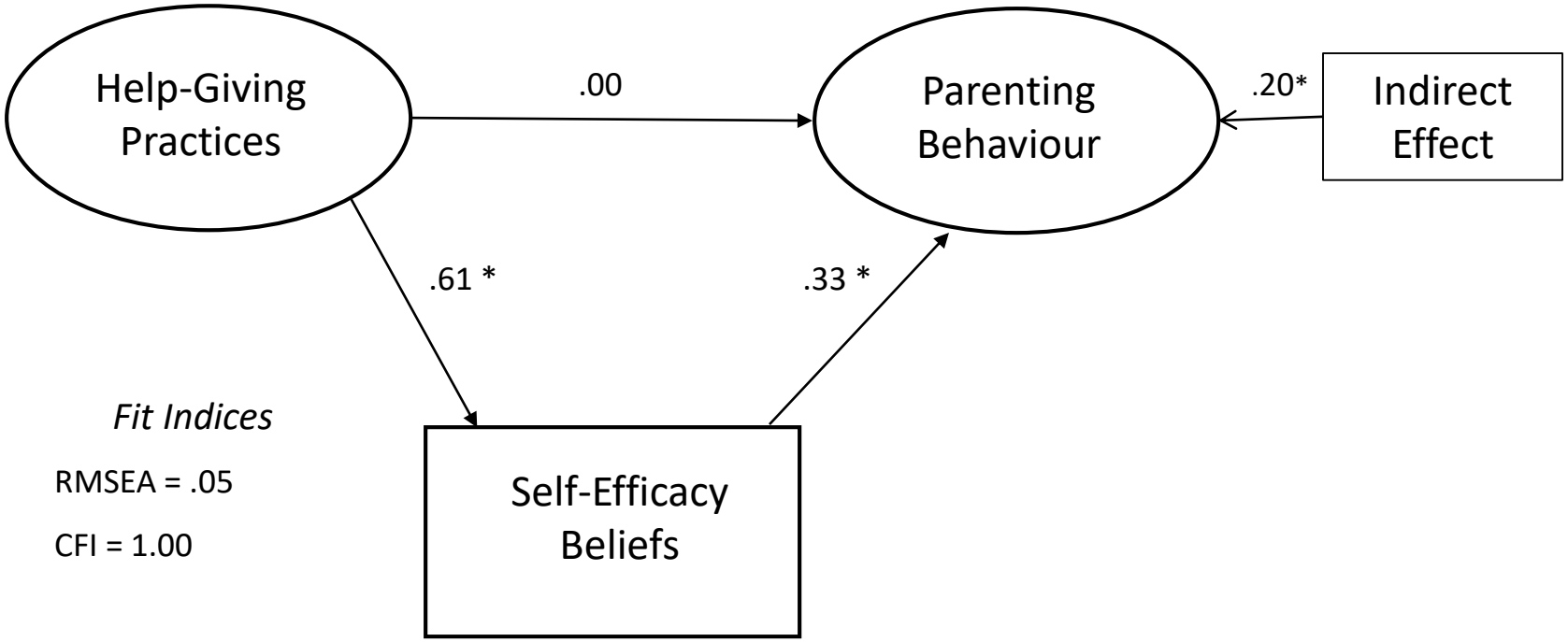
Stacked Correlation Matrices



Model for Testing the Direct and Indirect Effects of Family-Centred Practices or Parenting Behaviour



Meta-Analytic Structural Equation Modelling Results



* $p < .0001$.

Meta-Analytic Structural Equation Modelling of the Influences of Family-Centred Care on Parent and Child Psychological Health[a]

Studies

15 investigations of family-centred care that included measures of family-centred practices, self-efficacy beliefs, parent psychological health, and child psychological health

Sample

N= 2948 parents and other caregivers

Family-Centre Care Measures

Help-Giving Practices Scale, Family-Centred Practices Scale, and Enabling Practices Scale

Hypothesis

Based on contentions in the family-centred care literature, family-centred practices were expected to directly affect parent psychological health and parent health in turn affect child psychological health. Based on our own research, the relationships between family-centred care and both parent and child health were expected to be mediated by self-efficacy beliefs.

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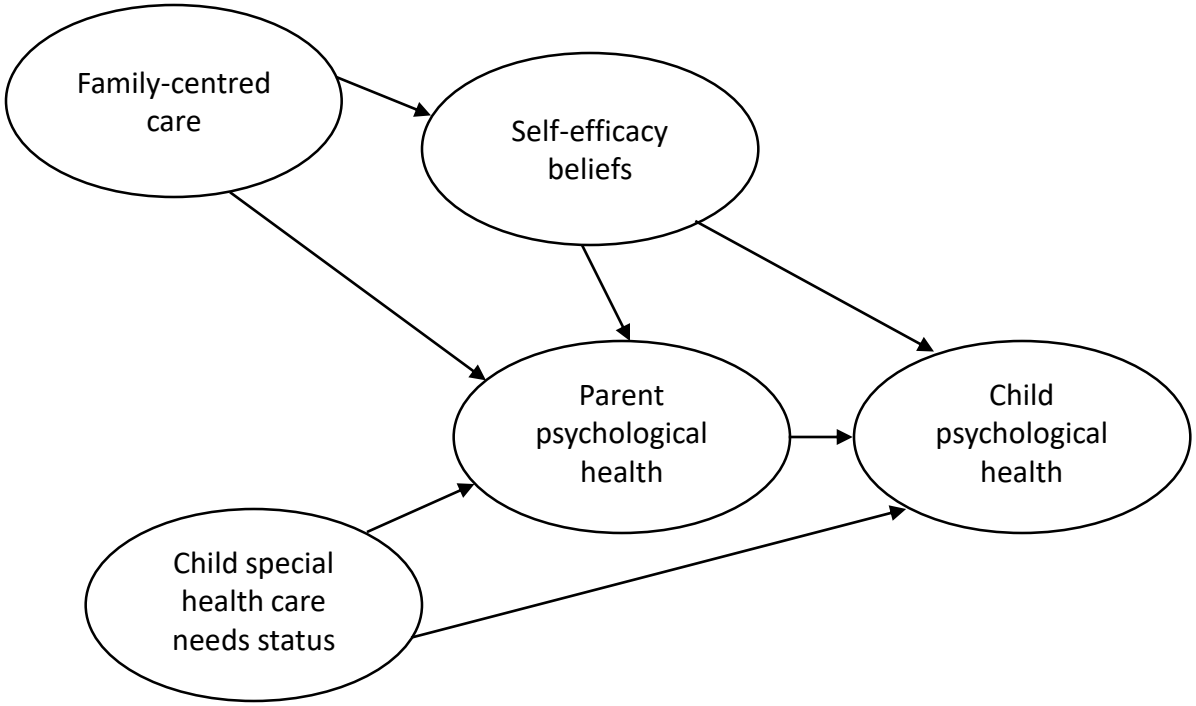
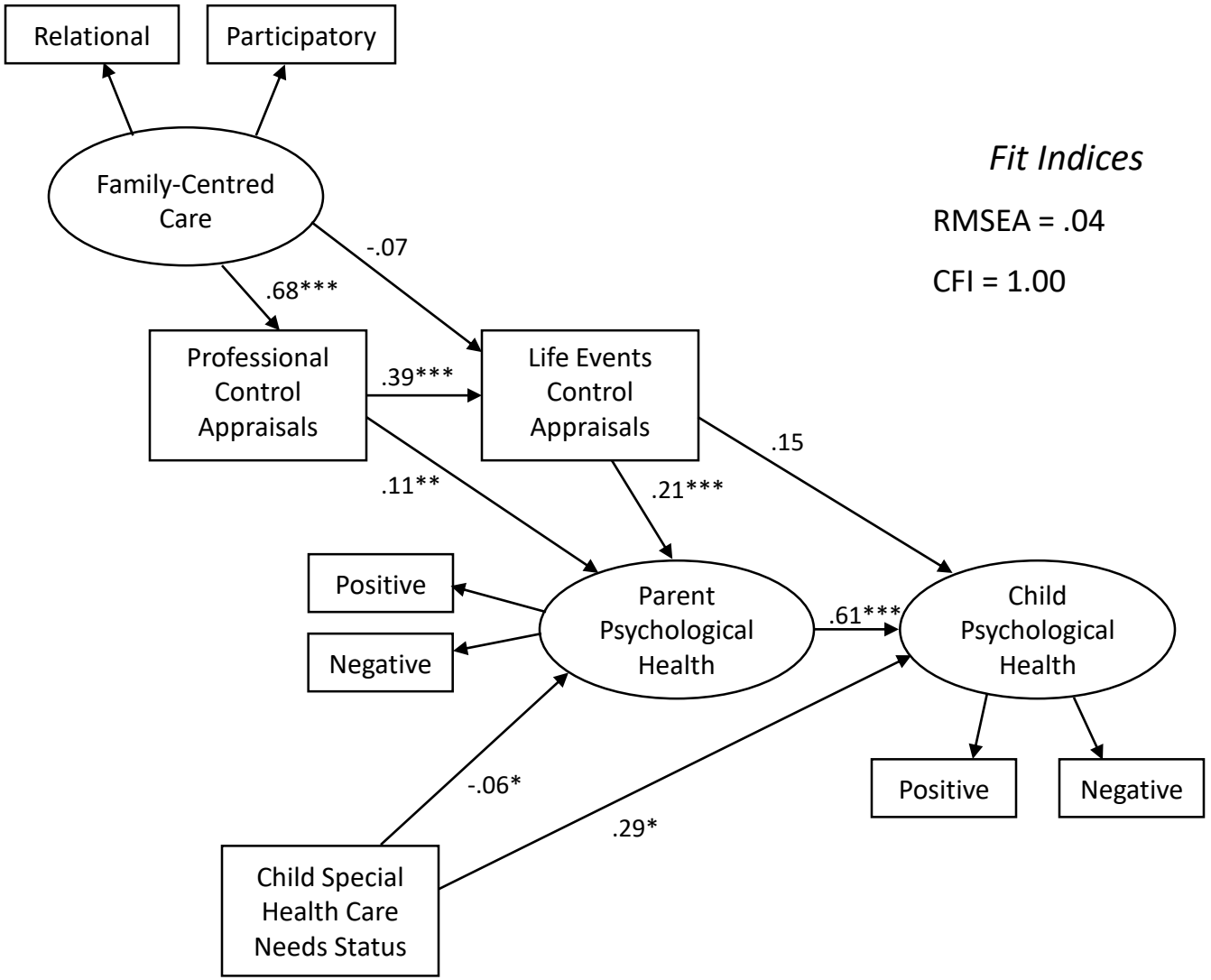
[a] Dunst, C.J., & Trivette, C.M. (2009). Meta-analytic structural equation modeling of the influences of family-centered care on parent and child psychological health. *International Journal of Pediatrics*, 2009. doi: 10.1155/2009/596840.

Structural Equation Model for Evaluating the Effects of Family-Centred Care, Self-Efficacy Beliefs, and Child Special Health Care Needs on Parent and Child Psychological Health



Meta-Analytic Structural Equation Modelling Results



. *$p < .01$, **$p < .001$, ***$p < .0001$.

Influences of Family-Systems Intervention Practices on Parent-Child Interactions and Child Development[a]

Studies

Eight studies that included measures allowing us to trace the effects of capacity-building help-giving practices and family-systems intervention practices on parent-child interactions and child development

Sample

910 preschoolers and their parents involved in different kinds of help-giving programs. Most of the children had developmental disabilities and about half of those children had multiple disabilities

Predictions

The influences of help-giving and family-systems intervention practices on parent-child interactions and child development would be indirect and be mediated by self-efficacy beliefs and parent well-being

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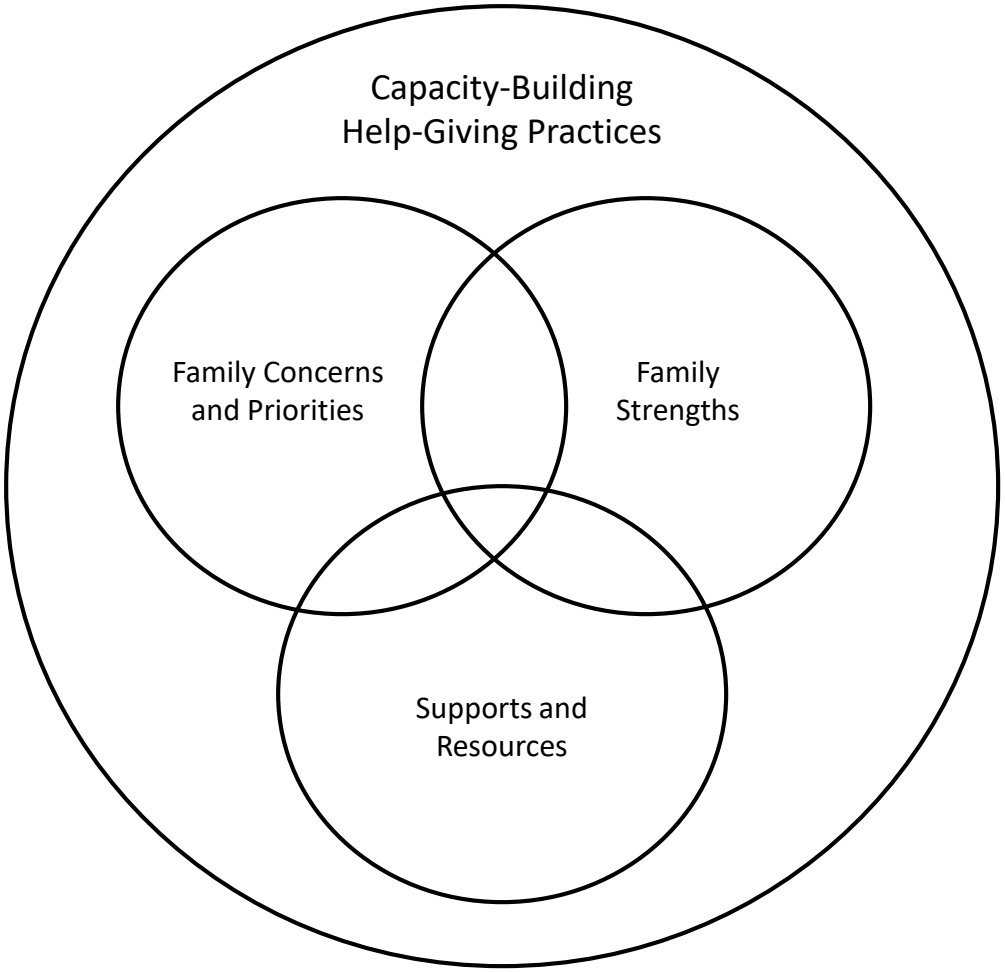
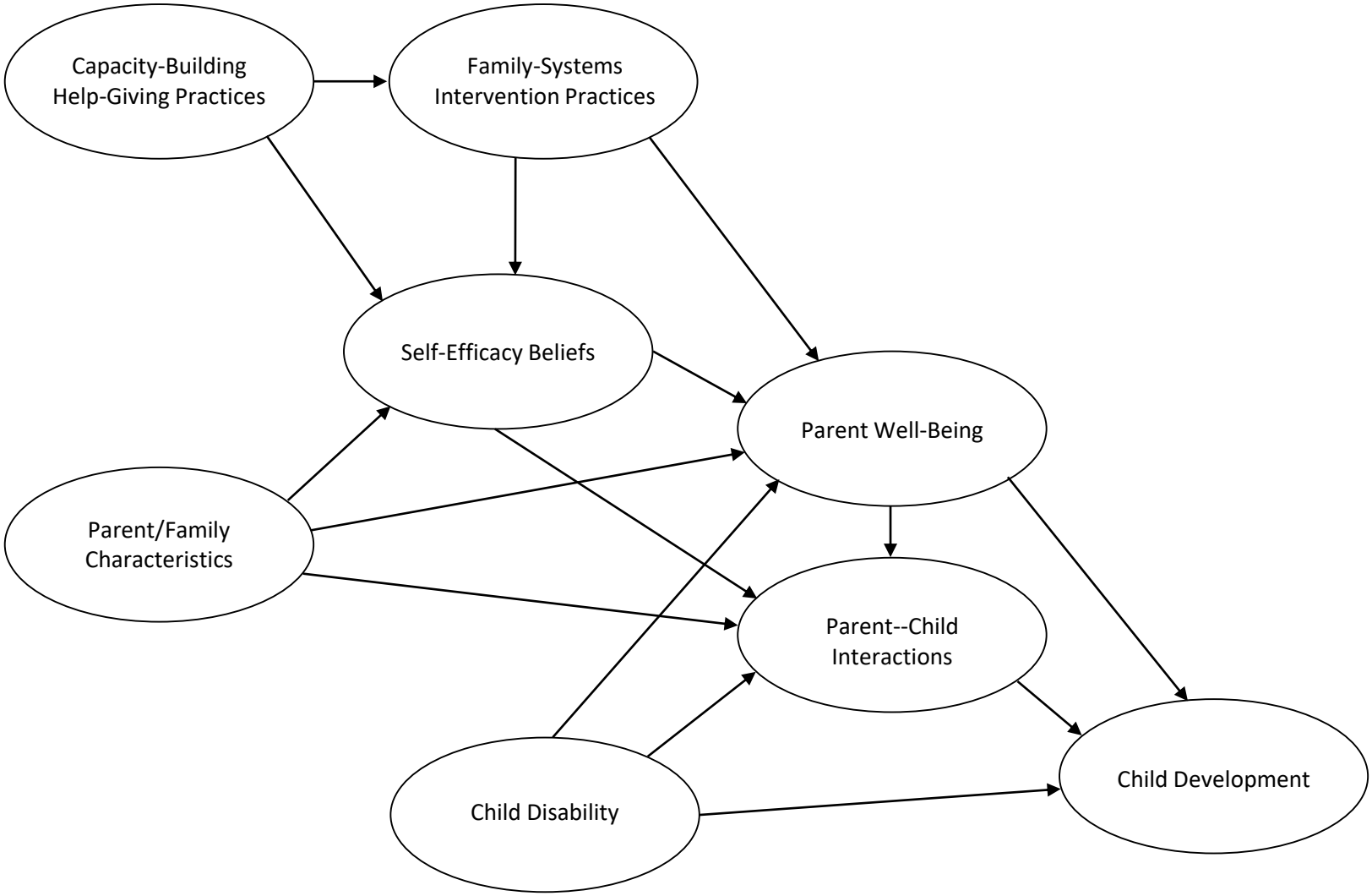
[a] Trivette, C.M., Dunst, C.J., & Hamby D.W. (2010). Influences of family-systems intervention practices on parent-child interactions and child development. *Topics in Early Childhood Special Education*, 30, 3-19.

Family-Systems Intervention Model[a]

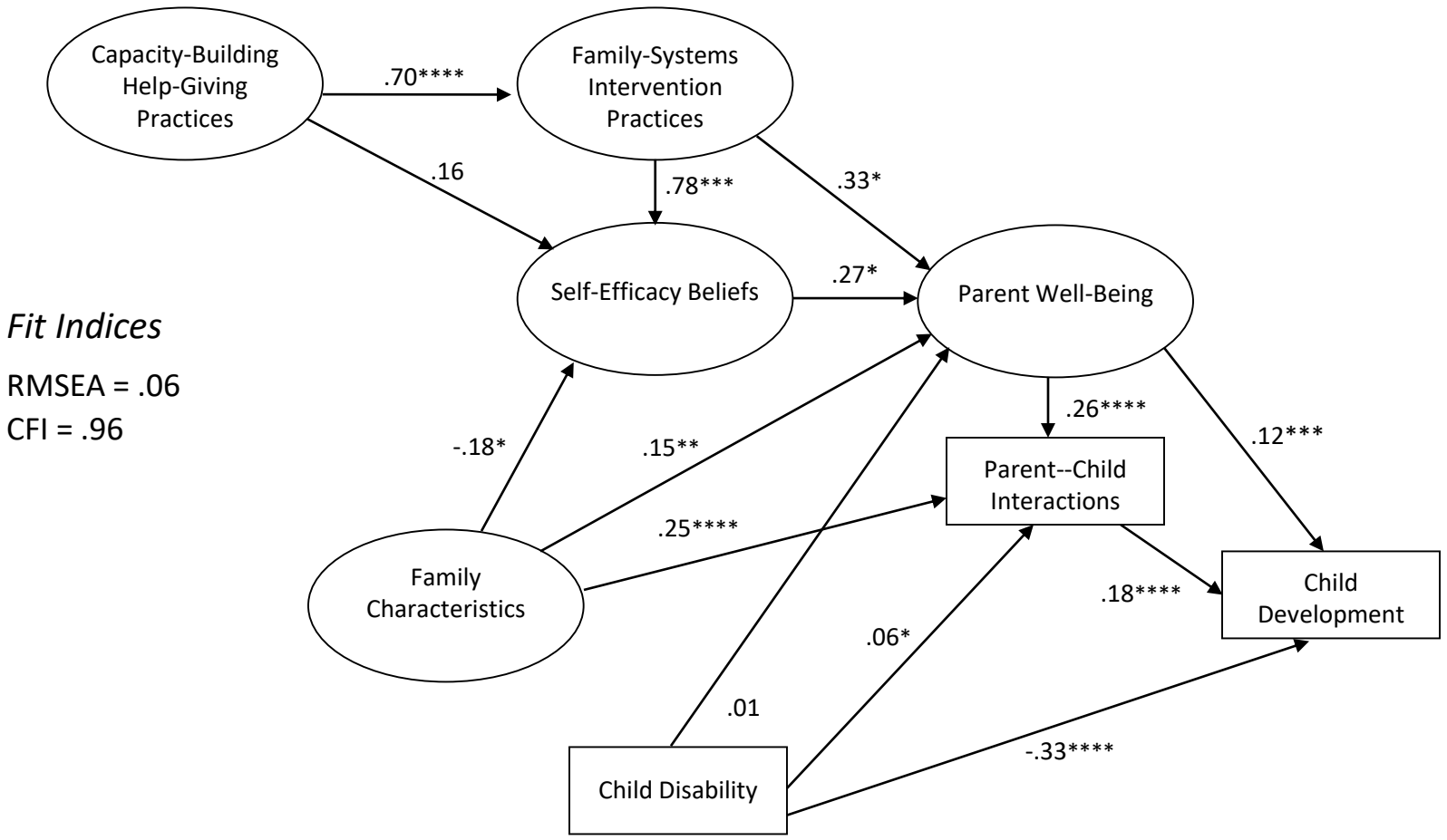


[a] Dunst, C.J., & Trivette, C.M., (2009). Capacity-building family-systems intervention practices. *Journal of Family Social Work*, 12, 119-143.

Model for Assessing the Direct and Indirect Effects of Different Predictor Variables on Parent-Child Interactions and Child Development



Meta-Analytic Structural Equation Modelling Results

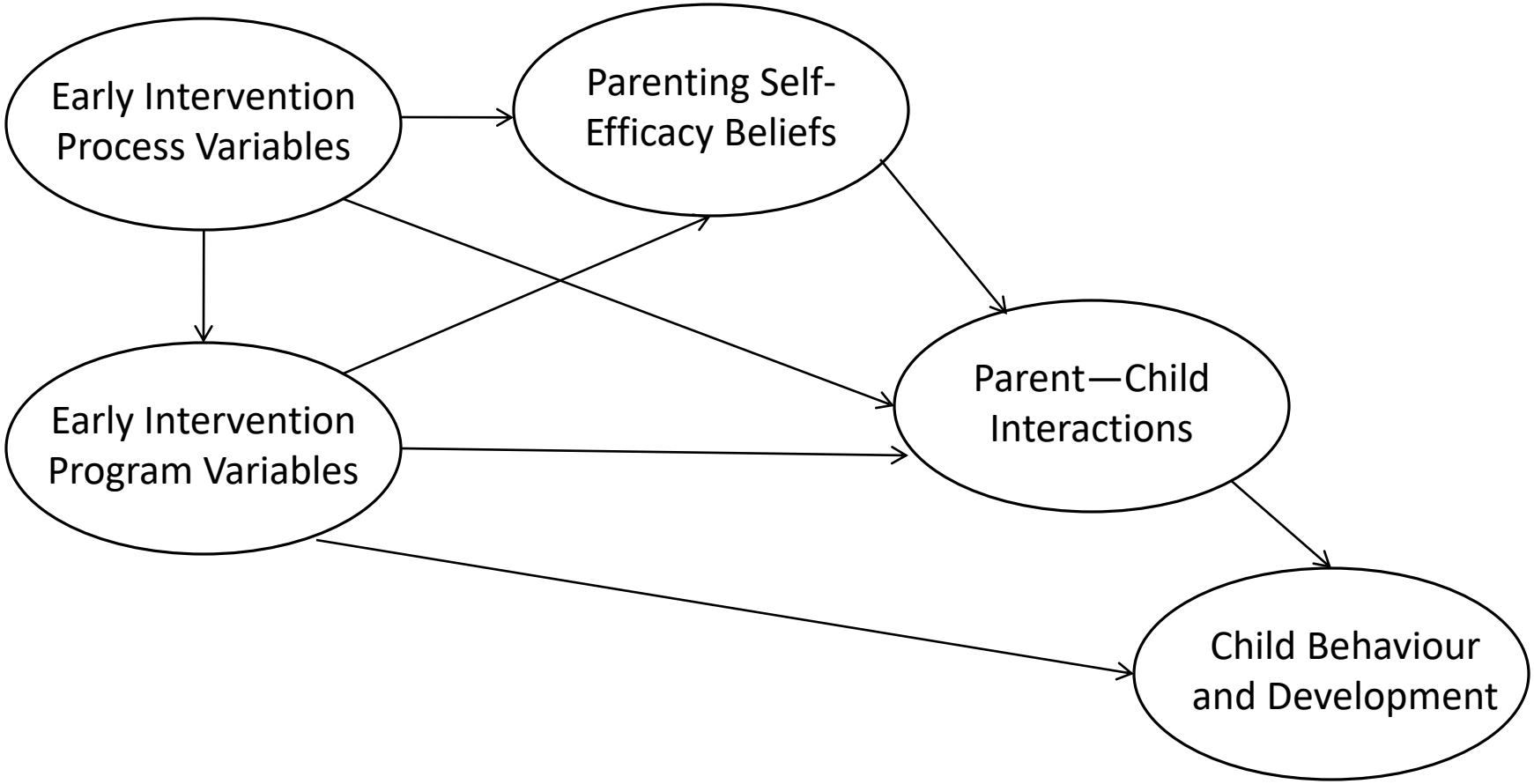


* p < .05. **p < .01. *** p < .001. **** p < .0001.

Meta-Analytic Structural Equation Modelling of Family Capacity-Building Early Intervention Practices

- This in *progress* study is integrating research on different kinds of early childhood intervention and evaluating whether or not capacity-building help giving practices and different program variables (dose, type of service, etc.) have the same direct and indirect effects on parent self-efficacy beliefs, parent-child interactions, and child outcomes
- One goal is to determine if the process and program variables operate in the same way for different kinds of interventions
- The planned analyses will include tests of both moderators and mediators to identify the ***conditions under which*** family capacity-building practices have optimal positive effects

Model for Evaluating the Influence of Process and Program Early Intervention Variables on Parenting and Child Outcomes



Finishing Up!

- Final lecturer comments and remarks
- Student questions, comments, challenges, etc.
- Lecturer-student discussion, conversation, dialogue, etc.
- Any other things to clarify or discuss?