

MODELING THE EFFECTS OF EARLY CHILDHOOD INTERVENTION VARIABLES ON PARENT AND FAMILY WELL-BEING¹

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Abstract: *Structural equation modeling was used to evaluate the effects of family, child, and both early childhood intervention process and structural variables on parent and family well-being in a sample of 250 parents involved in birth to age three early childhood intervention programs. Family SES and income had direct positive effects, family-centered early intervention practices had direct and indirect positive effects, perceived program control appraisals had direct and indirect positive effects, and early intervention program service intensity had direct negative effects on either or both self-efficacy beliefs and parent and family well-being. Findings are discussed in terms of the benefits and limitations of different features of early childhood intervention and the use of SEM for program evaluation.*

Key words: *Early childhood intervention; program evaluation; structural equation modeling; effects decomposition*

1. Introduction

Multivariate, system theory perspectives of early childhood intervention research and practice place major emphasis on how intervention and nonintervention factors influence child and family development and functioning, and how intervention variables account for variation in child and family outcomes beyond those associated with nonintervention factors (Dunst, Snyder, and Mankinen 1988; Dunst and Trivette 1997; Guralnick 1997; Marfo and Cook 1991; Marfo and Dinero 1991; Marfo et al. 1992). As part of ecological system theory, early childhood intervention is considered an environmental

factor that would be expected to show complex relationships with other environmental variables, and together with different person variables, have either favorable or unfavorable consequences on human behavior and functioning (Bronfenbrenner 1979).

Research and evaluation on the characteristics and effectiveness of early childhood intervention having positive consequences on child, parent, and family functioning continues to expand (e.g., Guralnick 1997; Meisels and Shonkoff 2000). Most evaluation studies, however, have in the past and continue to be conducted using univariate, main effects data analysis procedures, despite the fact that more powerful statistical analysis techniques are available for investigating complex relationships among variables, one of which is structural equation modeling (Bentler 1995; Joreskog and Sorbon 1993). Previous research has found structural equation modeling especially useful for program evaluation purposes (e.g., Hennessy and Greenberg 1999; Lipsey and Cordray 2000; Reynolds 1998; Rosenheck et al. 2001; Turnbull 1999).

Structural equation modeling (SEM) has been used in only a few studies investigating the effects of early childhood intervention and nonintervention variables on child and parent outcomes (e.g., Dunst 1999; Sorbon 1982; Thompson et al. 1997). Thompson et al. (1997) used SEM to investigate the influences of early intervention program characteristics, social support, and program family-centeredness on both parent stress and empowerment and found that social support and family-centeredness had both direct and indirect positive effects on both aspects of parent functioning. Similarly, Dunst (1999) found that early intervention program family-centeredness had direct and indirect positive effects on parents' appraisals of different kinds of parenting supports, but that program characteristics (number of child services & frequency of child contacts) had negative effects on the same outcome measures.

The study described in this paper used SEM to evaluate the effects of a number of person and environmental (early childhood intervention) variables on parent and family well-being. Well-being is generally recognized as an important family-level outcome of early childhood intervention (Bailey et al. 1998; Krauss and Jacobs 1990), and a mediator of the kinds of parenting interactional styles (Dunst and Trivette 1988; Shonkoff and Phillips 2000) known to be related to positive child outcomes (e.g., Landry et al. 2001; Mahoney et al. 1998; NICHD Early Child Care Research Network 1999). The study differed from other investigations of early childhood intervention by integrating five heretofore separate conceptual and theoretical approaches into a broader-based multivariate framework for evaluating the determinants of parent and family psychological health. The first is based on research investigating the influences of family socioeconomic status on health and mastery outcomes (Turner, Lloyd, and Roszell 1999). The second is based on research investigating the sources and consequences of perceived control appraisals (Bandura 1997; Skinner 1995). The third is based on evidence demonstrating the effects that the birth and rearing of a child with a disability has on family adaptation and stress (Roberts and Wallander 1992). The fourth is based on research investigating the effects of family-centered help giving practices on different aspects of perceived control appraisals and family functioning (Dunst and Trivette 1996; Dunst, Trivette, and Hamby 2006; Dunst, Trivette, and Hamby 2007). The fifth is based on the hypothesized relationship between early intervention program structural features (service intensity, duration, age of onset, etc.) and both child and family outcomes (e.g., Bryant and Maxwell 1997; Guralnick 1998).

2. A Multivariate Model of Early Childhood Intervention

The manner in which the different person and environmental variables were expected to be related to parent and family psychological functioning is shown in Figure 1. The model evaluated the influence of different person and environmental variables on perceived control and well-being, where the direct and indirect relationships among the variables shown in Figure 1 and described below were based on prior research. The study itself included the measurement of the independent and dependent (well-being) measures, respectively, on two occasions, six months apart to eliminate statistical problems associated with temporal codependencies and to improve confirmatory inferences about direction of effects (Kenny 1979).

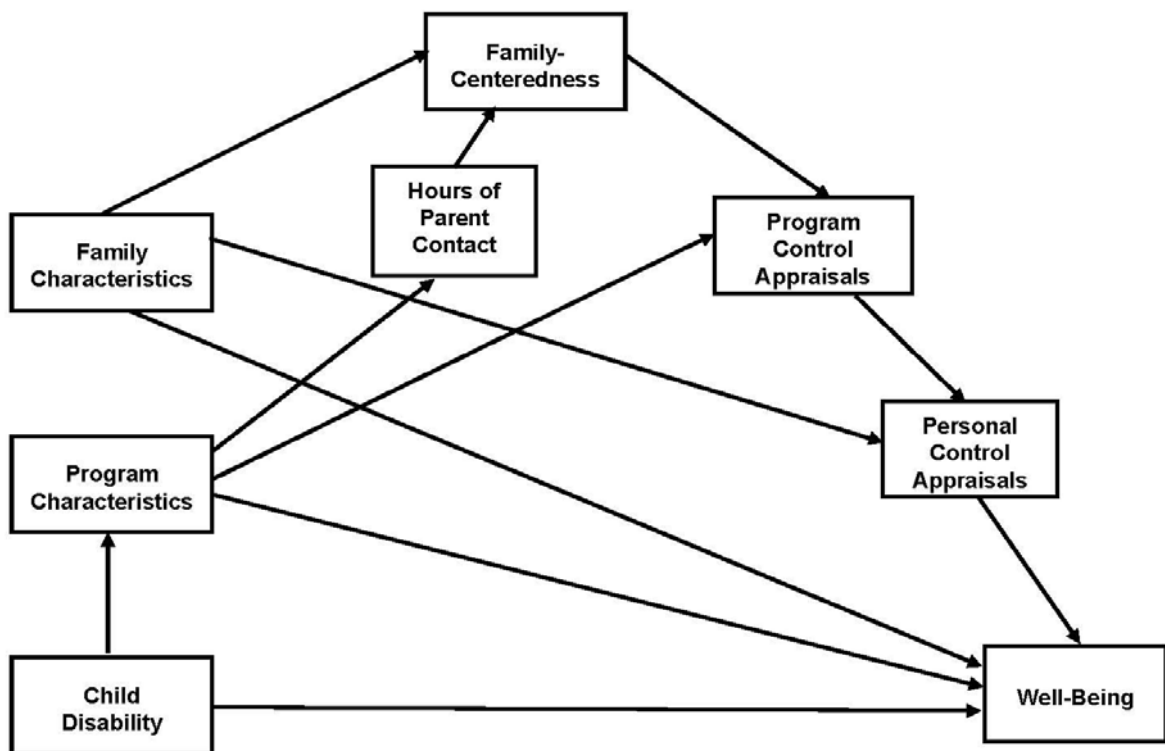


Figure 1. Hypothesized relationships among five sets of program and person variables and their direct and indirect influences on psychological well-being.

Socioeconomic Status

Socioeconomic status (SES) is a composite index typically ascertained by income, educational attainment, and occupational prestige (Dutton and Levine 1989; Entwisle and Astone 1994). Research indicates that the presence of more favorable socioeconomic factors is consistently related to a heightened sense of personal control (Turner, Lloyd, and Roszell 1999; Ziff, Conrad, and Lachman 1995) and better health status (Adler et al. 1994; Diener 2000; Diener and Oishi 2000; Ross and Van Willigen 1997), including psychological health (Bobak et al. 1998; Turner, Lloyd, and Roszell 1999). The influence of SES on health status

has been found to be both direct and indirect, mediated in part by personal control and mastery (Turner, Lloyd, and Roszell 1999).

Findings from studies of families of young children with or at risk for delays shows that SES is related to parent and family functioning in a manner identical to that found in other investigations (Dunst, Trivette, and Cross 1986), and that SES is related to personal control appraisals over general life events (Thompson et al. 1997) but is generally not associated with control appraisals that pertain to desired resources and supports from an early childhood intervention program or practitioner (Trivette et al. 1995; Trivette, Dunst, and Hamby 1996, 1996). Accordingly, we hypothesized that SES would be directly related to parent and family well-being, directly related to personal control (general life event) but not to early childhood intervention program control appraisals, and indirectly related to well-being through personal control appraisals.

Studies of the relationship between SES and parent judgments of the extent to which early childhood intervention program practices are family-centered indicate that families with higher SES backgrounds tend to assess program practices as less family-centered compared to families from lower SES backgrounds (Dunst, Brookfield, and Epstein 1998; King et al. 1999). A secondary hypothesis was that SES would be negatively related to parents' judgments about program family-centeredness.

Perceived Control

Research has shown that personal control belief systems are multidimensional (Bandura 1997; Skinner 1996), and that control appraisals over specific life events or domains of functioning contribute to a general sense of self-efficacy (Skinner 1995). Perceived control has been found to be an important component of self-efficacy (Bandura 1997), a positive contributor to better health status (Bandura 1997; DeVellis and DeVellis 2001; Taylor et al. 2000), including psychological well-being (Grob 2000), and a buffer against the deleterious effects of negative life events (Turner, Lloyd, and Roszell 1999). We hypothesized that perceived control would be directly related to parent and family well-being, and that the strength of the relationship would be greater for general life events compared to control appraisals over the provision of early childhood intervention program resources and supports (Dunst, Trivette, and Hamby 2006).

Child Disability

Unexpected and threatening life events are typically associated with negative reactions (e.g., Figley and McCubbin 1983). The birth and rearing of a child with a disability is a life event that is generally associated with higher levels of parent and family psychological distress (Crnic, Friedrich, and Greenberg 1983), where the degree of negative reaction is strongest in situations where a child's disability and associated behavior problems or difficulties necessitate considerable adaptation or adjustment (e.g., Patterson and McCubbin 1983). Research demonstrating that children with multiple and complex disabilities are sources of more family stress (Blacher 1984; Dunst, Trivette, and Cross 1986; Holroyd 1987; Wallander et al. 1989) was the basis of the hypothesis that the more pronounced and complex a child's disability, the more negative the relationship with parent and family well-being.

Family-Centeredness

Family-centered practices involve family decision-making and action that honors and respects family choices, preferences, and desires (Dunst 1997; Roberts, Rule, and Innocenti 1998). The extent to which early childhood intervention program philosophy and practices are family-centered (Dunst 1997) has consistently been found to be associated with a heightened sense of self-efficacy regarding the ability to procure desired resources from an early childhood intervention program (Thompson et al. 1997; Trivette, Dunst, and Hamby 1996; Dunst, Trivette, and Hamby 2006). Furthermore, control appraisals pertaining to needed resources and supports from an early intervention program (program control appraisals) have been found to be related to a greater sense of control over general life events (Thompson et al. 1997). A greater sense of personal control, in turn, has been found to be associated with more positive psychological well-being and functioning (Dunst et al. 1988; Dunst et al. 1993). We hypothesized that family-centeredness would be directly related to early childhood intervention program control appraisals, and would be indirectly related to well-being mediated by personal control appraisals.

Research on the factors associated with variations in family-centered practices indicates that more frequent contact by early intervention program practitioners with parents is positively related (Dunst 1999; Trivette et al. 1995), and more services provided to a child is negatively related (Dunst, Brookfield, and Epstein 1998), to parents' appraisals of family-centeredness. Accordingly, we hypothesized that the amount of contact between practitioners and parents would be positively related to judgments about family-centered practices but negatively related to the provision of more child-related services.

Program Variables

The way in which social action programs are organized, and the manner in which interventions are provided (what, where, how much, etc.), matters in terms of observed outcomes (Crane 1998; Guralnick 1997; Schorr 1997). Early intervention program variables and features, including, but not limited to, service intensity, length of program involvement, and service delivery location, have been implicated as important factors having positive effects on family functioning and adaptation (see e.g., Krauss 1997). Results from studies examining intensity (cf., Innocenti and White 1993; Wolery 2000), length of program involvement (cf., Bryant and Graham 1993; Innocenti and White 1993), and service delivery location (cf., Harbin, McWilliam, and Gallagher 2000; White and Casto 1985) have produced mixed findings, with some studies yielding positive effects and other studies producing negative effects. For example, Havemen, van Berkum, Reijnders, and Heller (1997) reported positive effects of "more is better," whereas Dunst (1999) and Weller (1991) reported negative effects of greater numbers of services on parent and family functioning.

The following hypothesized set of relationships was posited between length of program involvement, service delivery location, and service intensity (number and frequency of child services). As the length of time a child was involved in early intervention increased, it would become more likely that services would be provided outside a child's home (Kochanek and Buka 1998; Dunst 2002) and that the intensity of child services provided by professionals would increase (Dunst 1999). Provision of early intervention outside a child's home was expected to be related to a greater number of child services and more frequent professional contact with a child (Dunst 1999; Kochanek and Buka 1998). In turn, as the number of child services increased, professional contact with a child would become more frequent (Dunst 1999; Dunst, Brookfield, and Epstein 1998). Additionally, we hypothesized that the more profound or complex a child's disability, the longer the child would be involved in early intervention, and the more child services he or she would receive (Shonkoff et al. 1992).

Both primary (Dunst 1999; Shonkoff et al. 1992; Taylor, White, and Kusmierek 1993) and corroborating (Dunst, Trivette, and Jodry 1997) evidence was the basis for the hypothesis that the more intense early childhood intervention (i.e., the greater the number of professionals working with a child, and the more frequently they provided services), the more negative would be the influences on parent and family functioning. The expectation that more services provided more frequently by more professionals would have negative effects on parent and family functioning can be explained in terms of a "pile-up" effect of stressors (McCubbin, Cauble, and Patterson 1982). The birth and rearing of a child with a disability brings the child and his/her parents into frequent contact with many different helping professionals (e.g., Berry and Hardman 1998; Marshak, Seligman, and Prezant 1999), the consequences of which are not always positive (e.g., Dunst and Trivette 1988; Newson and Schultz 1998; Affleck et al. 1989). Evidence from a number of sources indicate that well meaning (but often conflicting) advice from different helpgivers can sometimes be confusing and increase caregiver burden and stress (Haveman et al. 1997).

The approach to combining theory building and SEM for evaluating intervention and nonintervention factors influencing parent and family-well-being was considered an especially appropriate strategy for testing the multivariate model of early childhood intervention. According to Hennessy and Greenberg (1999), "An explicit program theory highlights the distinctions between the role of background or exogenous variables versus those that reflect program processes and produce the program's effects. The identical distinction among background, mediators, and outcome variables is the central [feature] of SES because it is used to model sequential systems of variables and to estimate the relationships between them" (p. 472).

3. Method

Participants

The participants were 250 parents and caregivers and their children who were involved in 59 early childhood intervention programs in a northeastern State. They were first surveyed when their children were receiving early childhood intervention, and subsequently completed a number of self-report scales 6 months later (hereafter referred to as Follow-Up). The sample included those children and their parents who had "graduated" from early childhood intervention at the time the follow-up measures were administered and constituted a subsample of more than 1200 early intervention program participants in a larger study.

Table 1 shows the characteristics of the participants and their families and children at entry into the study. The largest majority (94%) of the participants were the biological mothers of the children involved in the early intervention programs. Nearly all the participants (89%) had at least a high school education. Three-quarters of the participants were married or living with a partner, and half (54%) were employed outside the home either part- or full-time. The socioeconomic backgrounds of the families were quite varied, with at least 16% of the sample constituting each of five different socioeconomic classes (Hollingshead 1975). Approximately 25% of the families' incomes placed them below the poverty level.

The children, on average, were 26 months of age ($SD = 8.63$) at the time data collection first occurred, and had been involved in early intervention an average of 13 months ($SD = 9.37$). The children's diagnoses were quite varied, with approximately half of the group having identifiable disabilities or etiologies for their developmental delays or conditions.

Table 1. Characteristics of the Participants, Families, and Children in the Study

Participants	N	%	Family/ Child	N	%
Relationship to Child			Family Socioeconomic Status		
Biological Parent	232	94			
Foster Parent	11	4	Low	40	16
Grandparent	2	1	Low-Middle	42	17
Other	2	1	Middle	67	27
			Middle-Upper	58	23
			Upper	43	17
Gender			Family Income (Yearly)		
Female	233	95			
Male	13	5	<\$3,000 - \$5,000	16	6
			\$5,000 - \$10,000	33	13
Age (Years)			\$10,000 - \$20,000	72	29
18-29	86	34	\$20,000 - \$30,000	60	24
30-39	129	52	\$30,000 - \$40,000	28	11
40-49	27	11	\$40,000 - \$50,000	12	5
50+	8	3	\$50,000+	29	12
Education			Child Age (Months)		
Less than High School	27	11	0-12	28	11
High School Graduate	95	38	12-24	58	24
Some College	53	21	24-36	14	60
College Graduate	75	30	36+	11	5
Marital Status			Child Diagnosis		
Married/Living with Partner	189	76	At Risk	68	27
Single	37	15	Physical Disability	46	19
Divorced	17	7	General Delay	41	16
Widowed	4	2	Mental Retardation	36	14
			Language Delay	14	6
			Multiple Disability	13	5
			Behavioral Disability	9	4
			Sensory Impairment	7	3
			Other	16	6
Employment Status					
Employed	135	54			
Not Employed	115	46			

Procedure

Survey. The survey completed at the beginning of the study asked for background information about the respondent (age, education, marital status, etc.), his/her spouse or partner and family (occupation, income, etc.), and the child receiving early intervention (age, reason for participation in early intervention, disability or kind of delay, etc.). Additionally, the survey asked the respondent for information about the types of services his or her child was receiving, where the services were being provided, and how often the respondent and his/her child received family-level and child-level services, respectively. The respondents were also asked to rate the extent to which: (a) the early intervention program had adopted a family-centered philosophy, employed family-focused and family-centered program practices, and program practitioners used family-centered helping practices and (b) he/she had control over the kind of help and services provided by the early childhood intervention program.

Follow-up. The participants completed personal control appraisal (Boyd and Dunst 1996), psychological well-being (Radloff 1977), and family well-being (McCubbin and Comeau 1987) scales at follow-up. The control appraisal scale included items that asked respondents to indicate the extent to which they had control over a number of aspects of early childhood intervention program practices and other life events and experiences. Respondents assessed both their personal well-being and family psychological health by indicating the extent to which different behavior states were experienced by the respondent and his or her and family.

Measures

Family socioeconomic status. Socioeconomic status (SES) was determined from yearly family income, years of formal education, and the occupation of the respondent (if employed outside the home) and/or his or her spouse or partner using the Hollingshead (1975) scoring system. Family income was scored on a 10-point scale ranging from less than \$US3,000 per year (1) to more than \$US50,000 per year (10).

Child severity of disability. Orthogonal contrast coding (Cohen and Cohen 1983) was used to place the children on an ordered continuum from at-risk (-3) to multiply disabled (3). The ordering of children according to diagnostic group was: at-risk, language delay, general developmental delay, identified disability (sensory impaired, physical disability, mental retardation, or behavioral disability), and multiple disabilities.

Length of program involvement. The child's age in months at the time the survey was completed minus the child's age in months at entry into the early intervention program was used as the measure of length of program involvement.

Intensity of child services. Intensity of child services was determined by the combination of number of child services and the frequency of provision of the services. Number of child services received was the sum of eight different types of child services being provided at the time the survey was completed. The kinds of services included physical therapy, occupational therapy, speech/language therapy, audiology, special instruction/special education, developmental services, nutrition, and nursing/medical services. Child contact was rated on a 5-point scale varying from one time or less a month (1) to 5 days or times per week (5). Intensity was calculated as the product of the number and frequency of child services.

Frequency of parent contact. Respondents rated the hours of parent (respondent) contact with the early intervention program staff on a 6-point scale ranging from less than one hour per month (1) to 5 or more hours per month (6).

Service delivery location. Orthogonal contrast coding (Cohen and Cohen 1983) was used to ascertain the extent to which child services were provided mostly or entirely in the respondent's homes (home-based) or were provided outside the home (e.g., center-based or preschool program). Initial inspection of the service delivery location data indicated that where services were provided varied as a function of the types of services provided. We therefore computed three service delivery measures, one for physical and occupational therapy, one for speech/language therapy and audiology, and one for special education and special instruction. For each service combination, a score of -2 was assigned if the child received both services outside the child's home, a score of -1 was assigned if the child received only one of the services and it was provided outside his/her home, a score of +1 was assigned if both services were provided and one was provided in the child's home, and a score of +2 was assigned if either or both services were provided in the child's home and no services were provided outside the home.

Family-centeredness. The extent to which respondents indicated that the early intervention program adopted and adhered to 12 guiding family support principles ($\alpha = .89$)

was used as the measure of family-centered program philosophy (Dunst et al. 1991). The principles included value statements about strengths-based practices, parent/professional partnerships, family empowerment, promotion of parent competence, healthy family functioning, etc. Each value statement was rated on a 5-point scale ranging from not at all true (1) to almost always true (5) that the program adhered to the principles.

Family-centered program practices ($\alpha = .92$) were ascertained using the 10 family-focused and 10 family-centered practices items on the *Family-Oriented Program Practices Scale* (Dunst and Trivette 1995). The practices rated by the respondents included parent participation and decisions involving Individualized Family Service Plans; practitioner flexibility and responsiveness to family concerns and priorities; family choice involving the sources, location, and focus of early interventions; etc. Respondents indicated on a 7-point scale the extent to which they strongly disagreed (1) to strongly agreed (7) that the program used each practice.

Family-centered helpgiving ($\alpha = .85$) was assessed using five items on the *Helpgiving Practices Scale* (Dunst, Trivette, and Hamby 1996). The helpgiving practices rated by the respondents included practitioner active and reflective listening, empathy, and responsiveness to parent requests. The extent to which each practice was experienced by a respondent was ascertained using 5-point rating scales with markers that varied depending upon the item being rated.

Program and personal control appraisals. The survey included a single program control appraisal item that asked a respondent to indicate on a 10-point scale the extent to which he/she had control over the help and services received from the early intervention program staff (Affleck, Tennen, and Rowe 1991). The measure was constructed so that it captured the respondents' perceived self-efficacy in terms of his/her ability to procure desired resources and help from the early childhood intervention program.

The measure completed by the respondents at follow-up was the *Personal Assessment of Control Scale* (Boyd and Dunst 1996). This scale includes five statements about respondent control over different aspects of early childhood intervention program services and practices ($\alpha = .81$), and four statements about personal control involving general life events ($\alpha = .73$). Respondents rated the extent to which each control appraisal statement was true on a 5-point scale varying from rarely true (1) to almost always true (5).

Parent and family well-being. The respondents completed at follow-up both the *Center for Epidemiologic Studies Depression Scale* (CES-D, Radloff 1977) and the Health and Mastery subscale of the *Family Inventory of Resources and Management* (FIRM, McCubbin and Comeau 1987). The CES-D includes 20 statements about different psychological states ($\alpha = .94$), with each rated on a 4-point scale ranging from experienced less than 1 day per week (1) to experienced 5-7 days per week (4) for the most recent seven-day period of time. The FIRM Health and Mastery subscale includes 20 statements about family well-being and competence ($\alpha = .94$), which were rated in terms of how well the respondents' families were functioning on a 4-point scale ranging from not at all well (1) to very well (4). The CES-D and FIRM were both scored so that higher scores indicated better functioning.

Data Analysis

EQS (Bentler 1995) was used for the SEM. The model that was evaluated assessed the effects of family characteristics, child disability, family-centeredness, and the early intervention program variables on both perceived control appraisals and parent and family well-being, where the explicit hypothesized relationships among variables between sets were based on theory and corroborating research evidence described in the introduction.

The extent to which the model fit the data was ascertained by a series of structural equations simultaneously analyzed by EQS, with the variance of one measure of each of

three latent variables (family characteristics, family centeredness, and program location) initially fixed to 1.0. Three sets of statistics were the focus of substantive interpretation in each analysis: (1) the fit indices of the models (Hu and Bentler 1995), (2) the standardized parameter estimates (Hoyle 1995), and (3) the percentage of variance accounted for by the independent variables in each regression model included in the analysis (Bentler 1995).

The three fit indices produced by EQS (Bentler-Bonett Normal Fit Index [NFI], Bentler-Bonett Nonnormal Fit Index [NNFI], & Comparative Fit Index [CFI]) were used to determine how well model specification was achieved. According to Bentler (1990), CFI is the index of choice as the measure of model fit, and therefore was used as the primary index for assessing whether an adequate fit was achieved. (The χ^2 goodness-of-fit test was not considered because of its susceptibility to influence by small and large sample sizes and other statistical problems; Hu and Bentler 1995.) The magnitude and direction of the standardized parameter estimates were used to discern the nature of the relationships between variables in the models. "Standardized parameter estimates correspond to effect size estimates" (Hoyle 1995, p. 9). Percentage of variance accounted for in the mediated (perceived control appraisals) and dependent (well-being) variables by the independent variables for each equation in the structural model was used to ascertain the strength of the relationships among different sets of predictor measures and both perceived control and well-being.

The indirect effects of the four primary predictor variables (family characteristics, program characteristics, family-centeredness, and child disability) on personal control and parent and family well-being were discerned by effects decomposition (Kline 2005). The direct, indirect, and total effects of the predictor variables mediated by perceived control appraisals were computed to isolate the sources and paths of influence on parent and family well-being.

Post hoc model respecifications were tested to confirm or disconfirm other possible linkages among measures. Both the direct and indirect effects of new paths on personal control and parent and family well being were discerned by effects decomposition.

4. Results

Confirmatory Model Fit

Figure 2 shows the results of the confirmatory analysis. Two of the three fit indices were .92 or greater, indicating an acceptable fit of the model to the data. The comparative fit index (CFI) was .94, providing the best evidence that the model was supported by the relationships among the latent and measured variables. The standardized parameter estimates shown in Figure 2 show both the magnitude and direction of relationships among variables.

Family-centeredness. Both family characteristics and hours of parent contact were both related to family-centeredness in an expectant manner, $R^2 = .12$, $p < .01$. Families from higher SES backgrounds and those with larger incomes tended to assess practitioner and program practices as less family-centered ($\beta = -.12$, $p < .05$), whereas the more frequently practitioners had contact with the parents, the more likely the respondents indicated that the practitioners and their programs used family-centered practices ($\beta = .31$, $p < .001$). Child service intensity was unrelated to the family-centered practices measures.

Service intensity. The early childhood intervention program variables were related to one another as expected. The longer a child received early intervention, the more likely he or she received the services outside the home ($\beta = -.25$, $p < .001$) and the greater the intensity of service provision ($\beta = .46$, $p < .001$). Additionally, the more severe or complex a child's disability, the longer a child was involved in early intervention and the more intense

the services the child received ($\beta = .12, p < .05$). The three variables together were strongly related to service intensity, $R^2 = .37, p < .001$.

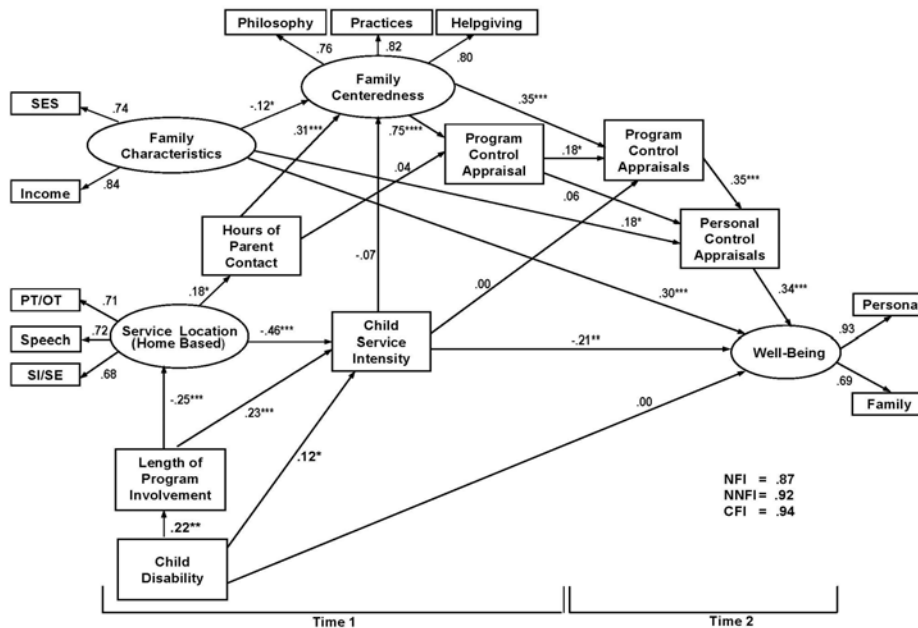


Figure 2. Relations between child and family variables, family-centeredness, early intervention program variables, and both control appraisals and personal and family well-being.

Notes: (NFI = Normed fit index, NNFI = Nonnormed fit index, and CFI = Comparative fit index. PT = Physical Therapy, OT = Occupational Therapy, Speech = Speech and language therapy and audiology, SI = Special instruction, and SE = Special education).
* $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0001$.

Perceived control. Family-centeredness was related to the program control appraisal at Time 1, $R^2 = .59, p < .0001$, and both the family-centeredness and Time 1 program control appraisal measures were related to Time 2 program control appraisals, $R^2 = .26, p < .001$. The strength of the relationship between the family-centered measure and Time 2 program control appraisals ($\beta = .35, p < .001$) was twice as strong as that between Time 1 and Time 2 program control appraisals ($\beta = .18, p < .05$).

Family characteristics were directly related to personal control appraisals ($\beta = .18, p < .05$). The structural equation predicting personal control appraisals at Time 2 produced an $R^2 = .16, p < .001$, with Time 2 program control appraisals ($\beta = .34, p < .001$) and family characteristics ($\beta = .18, p < .05$) both contributing to the amount of variance accounted for in the dependent measure. The three predictor measures taken together were significantly related to personal control, $R^2 = .16, p < .001$.

Well-being. Family characteristics ($\beta = .30, p < .001$) and personal control ($\beta = .34, p < .001$) were both related to parent and family well-being as expected. In both cases, the presence of more favorable personal and family characteristics was associated with more positive parent and family well-being.

The relationship between the early intervention program variables and well-being was as expected. The intensity of child services was negatively related to parent and family well-being where intensity was influenced by length of program involvement and service

delivery setting. Contrary to expectation, child disability had no direct effect on personal and family well-being.

The structural equation predicting parent and family well-being from the family, service intensity, child disability, and personal control measures yielded an $R^2 = .29$, $p < .0001$, with Time 2 personal control appraisals ($\beta = .34$, $p < .001$), and family characteristics ($\beta = .30$, $p < .001$) showing positive relationships with the dependent measure, and the intensity of child services ($\beta = -.21$, $p < .01$) showing a negative relationship with the well-being measure.

Effects Decomposition

Table 2 shows the findings from the seven sets of effects decomposition analyses. The pattern of results makes clear the importance of family characteristics, family-centeredness, and program control appraisals as determinant of both self-efficacy beliefs (personal control appraisals) and parent and family well-being.

Table 2. Standardized Direct, Indirect, and Total Effects of the Person and Intervention Variables on Perceived Control and Parent and Family Well-Being

Measures		Effects Decomposition		
Predictor	Criterion	Direct	Indirect	Total
Child Disability	Program Control (T1)	-	-.01	-.01
	Program Control (T2)	-	-.01	-.01
	Personal Control	-	.00	.00
	Well-Being	.00	-.04	-.04
Service Intensity	Program Control (T1)	-	-.05	-.05
	Program Control (T2)	.00	-.03	-.03
	Personal Control	-	-.02	-.02
	Well-Being	-.21**	-.02	-.23**
Family Characteristics	Program Control (T1)	-	-.09	-.09
	Program Control (T2)	-	-.06	-.06
	Personal Control	.18*	-.03	.15*
	Well-Being	.30**	.05	.35***
Family-Centeredness	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.

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

Child disability had neither direct nor indirect effects on any criterion measure. Service intensity had almost entirely direct negative effects on parent and family well-being.

The influence of family SES and income on both personal control and parent and family well-being was almost entirely direct. In contrast, the influence of family-centeredness on program control was both direct and indirect, and the influence of family-centeredness on personal control appraisals was indirect mediated by program control appraisals.

The influence of program control appraisals on self-efficacy beliefs (personal control appraisals) was both direct and indirect, and the influence of program control and personal control appraisals on parent and family well-being had a combination of direct and indirect effects.

Family-centeredness and program control appraisals were the only two predictor variables that had indirect effects on the criterion measures. In both analyses, the indirect effects of family-centered practices on parent and family well-being were mediated by program control appraisals.

Model Respecifications

Model respecifications were done by adding different paths to the model and rerunning the EQS analyses. This included paths between service location, length of program involved, and child disability and family-centeredness, and paths between service location and length of program involvement and program and personal control appraisals. None of the analyses changed the fit indices or structural coefficients for the already included or new paths. For example, it was reasonable to postulate that the birth and rearing of a child with a disability would have negative effects on perceived control, based on evidence that parenting efficacy appraisals are often taxed by such life circumstances (see especially, Bandura 1997, pp. 190-196). Post hoc model respecifications were made, and new models tested with paths linking child disability to both program control measures (Model II), personal control appraisals (Model III), and all three control measures simultaneously (Model IV). None of the fit indices changed in any analysis, and none of the added structural coefficients were statistically different from zero. Thus, the plausibility of an explanatory relationship between child disability and parent perceived control appraisals is not warranted *in the context of the model we tested*.

5. Discussion

Five conceptual and theoretical frameworks were used to build and evaluate a multivariate model of early childhood intervention. The SEM analyses produced findings that were consistent with the conceptual framework used to guide model specification. Both family socioeconomic factors and the family-centeredness of early intervention program philosophy and practices were directly related to perceived control appraisals in the manner expected, and the predicted direct and indirect influences of family-centeredness on well-being were for the most part substantiated by the results. The manner in which the early intervention program variables were interrelated was as predicted and showed negative influences on well-being. The influences that severity of child disability had on both the

length of program involvement and the number of services provided to a child by professionals was also as expected. Results add to the knowledge base regarding the relationships among intervention, nonintervention, and person variables (Bronfenbrenner 1992; Marfo and Dinero 1991; Marfo et al. 1992; Guralnick 1993), and how these various factors both individually and in combination contribute to variations in perceived control and personal and family well-being (Dunst 1999; King et al. 1999; Thompson et al. 1997).

Previous research has demonstrated that frequent contact by professionals with parents is related to variations in parents' judgments about family-centeredness (Dunst 1999), and that the family-centeredness of program practices and practitioner helpgiving is related to a heightened sense of control over early intervention program supports and resources (Judge 1997; Trivette, Dunst, and Hamby 1996, 1996). The present study helps explain the mechanisms through which these relationships operate to produce observed effects. The path linking hours of contact between parents and professionals to parents' program control appraisals produced results indicating that it is not contact per se that influenced perceived control, but rather *how* practitioners interacted with parents that accounts for a greater sense of control (Dunst 1997; Dunst and Trivette 1996). This was discernable by the nonsignificant structural coefficient between hours of contact and program control appraisals ($\beta = .04$), and the significant structural coefficients between hours of contact and family-centeredness ($\beta = .31$), and between family-centeredness and perceived control ($\beta = .75$).

The manner in which early intervention program variables were related to well-being is made clear by closely examining and analyzing the nature of the relationships among measures. Consider, for example, the result showing that the intensity of services provided to a child attenuated parents' judgments of parent and family well-being. This finding was expected based on theory and research about pile-up effects (McCubbin, Cauble, and Patterson 1982), where we predicted that the more frequently more professionals worked with a child, the more stressful it would be to the parents. Corroborating evidence indicating that heightened stress attenuates judgments about family-centered practices (King et al. 1999), and evidence showing that fewer rather than more professionals interacting with parents is related to positive parent and family functioning (Shonkoff et al. 1992), supports this interpretation.

The fact that severity of child disability was not directly related to parent and family well-being deserves comment inasmuch as our findings run counter to results reported by others (e.g., Holroyd 1987; Shonkoff et al. 1992). In the present study, children having different diagnoses or disabilities were ordered along a continuum from at-risk to multiply disabled, and orthogonal contrast coding (Cohen and Cohen 1983) was used to code severity of delay or disability. The extent to which this coding scheme may have masked differences between groups was assessed by running two one-way ANOVAs with child diagnosis as a grouping variable and the two well-being measures as dependent variables. This is the way most investigators have typically evaluated the influence of type of disability or severity of delay on parent and family functioning (e.g., Dunst, Trivette, and Cross 1988; Holroyd 1987). Neither of the ANOVAs produced significant results.

The value of SEM as an analytic tool for program evaluation purposes is offset by several interrelated, cautionary notes (see e.g., Mulaik and James 1995). One is the fact that confirmatory or causal inferences must be made carefully, and only after adequately ruling

out alternative explanations so that substantive meaning can be attributed to observed relationships between variables. The example above with regard to the differences between contact per se and the family-centeredness of the contacts, and their relationship to perceived control over early intervention program supports and resources, represents one way in which this kind of interpretive process proceeds, and adds to our understanding of the relationships between intervention and nonintervention variables and child and family outcomes.

A second, related issue has to do with the fact that we constructed and tested a single model, and that there are many other models that could be specified to account for the relations among variables. However, our SEM evaluation was strictly confirmatory based on prior research and theory that formed the foundation of model specification (Hennessy and Greenberg 1999). According to MacCallum (1995), "In the strictly confirmatory [SEM] strategy, the researcher constructs one model of interest and evaluates that model by fitting it to appropriate data. If the model yields interpretable parameter estimates and fits the data well, it is supported and considered a *plausible model*" (p. 31, emphasis added). The multivariate model that constituted the focus of this program evaluation study is not only plausible, but more importantly, contributes to our understanding of the interrelationships among variables of practical significance that inform "recipes for action" (Cook and Campbell 1979, p. 31). Moreover, the approach to model building and the use of SEM for evaluating the model serves as both theoretical and analytic tools for applied purposes (Hennessy and Greenberg 1999; Hopwood 2007).

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