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# Effects of contrasting approaches to the response-contingent learning of young children with significant developmental delays on parents' social-affective behavior

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## Abstract

The purpose of the analyses described in this report was to evaluate both the effects of two contrasting approaches to parent-provided child learning opportunities and the direct and indirect effects on both proximal and distal parent social-affective behavior and verbal appraisals. The participants were 71 children with significant developmental delays or multiple disabilities randomly assigned to an intervention that employed practices that either built on existing child behavior (asset-based practices) or focused on teaching children missing or delayed skills (needs-based practices). Findings showed that the asset-based intervention was associated with more parent-provided child learning opportunities and more child response-contingent behaviors, both of which were related to changes in parent proximal and distal social-affective behavior. Results indicated that parent efforts to promote child learning that built on existing child behavior had value-added influences on parents' sense of competence and psychological well-being manifested in terms of behavior indicators of affective gratification.

**Keywords:** Response-contingent learning games, Asset-based intervention, Parent social-emotional behavior, Parental psychological well-being

## Background

Transactional models of parent–child interactions posit reciprocal influences between child and parent behavior where parent behavior influences child behavior and child behavior influences parent behavior (Bronfenbrenner 1979; Sameroff 2009a). The consequences of these reciprocal influences can be either positive or negative, depending on the behavioral consequences of either or both the parent and child on one another (Miklowitz et al. 1989; Nelson et al. 2014; Sameroff 2009b; Shaffer et al. 2013; Tronick et al. 1982).

According to Goldberg (1977), parenting confidence and competence are either strengthened or compromised depending on the results of parenting practices. In situations where parenting practices have predictable or desirable consequences, parenting confidence and competence are likely to be strengthened. This, in turn, is likely to

positively influence the manner in which parents interact with their children. In contrast, in situations where parenting practices have unpredictable or undesirable consequences, parenting confidence and competence are likely to be compromised or attenuated. This, in turn, is likely to interfere with or negatively affect parent–child interactions. Mooney-Doyle et al. (2015), in a recent review of the parenting practices literature, found that efficacious parenting had positive effects on both child behavior and parents' responses to displays of child competence. According to Nelson et al. (2014), these reciprocal effects help to explain the “psychological mechanisms...that mediate the relationship between parent[ing] and well-being” (pp. 846–847).

A parent's sense of confidence and competence typically is manifested in terms of different behaviors, beliefs, and appraisals about one's own abilities to parent effectively (Coleman and Karraker 1997). Feelings of parent efficacy have been found to be correlated with indicators of enjoyment (Petrie-Thomas 2003), gratification (Koo and Moon 1998), satisfaction (Young et al. 2006), and other positive social-affective behavior (Boyum and Parke 1995; Dix 1991; Donovan et al. 2007; Salonen et al. 2009). These behaviors are indicators of positive psychological well-being and have been found to be the consequences of efficacious parenting practices (Nelson et al. 2014; Ritchie and Bryant 2012; Umberson 1989). According to Dix (1991), parent social-affective responses and their verbal concomitants influence parent–child interactions and efforts to engage children in everyday learning opportunities when parenting practices have expected consequences (see also Ahuvia et al. 2015). These positive experiences, in turn, have been found to be positively related to parent psychological well-being (Bryant et al. 2011; Dubroja et al. 2016; Lloyd and Briar-Lawson 2014; Umberson 1989).

Even cursory observations of parent–child interactions find that most mothers and fathers delight in their children's earliest accomplishments (see, e.g., Coleman and Karraker 1997). One of these accomplishments is an infant's ability to use behavior to produce or elicit reinforcing consequences and to recognize that he or she is the agent of those effects (Dunst et al. 2008; Rochat 2001). These types of child behavior-reinforcing consequences relationships are characteristic of response-contingent learning opportunities where a social or nonsocial environmental response is dependent on a child-initiated behavior (e.g., a child shaking a rattle to produce a sound) (Gunnar 1980; Hains and Muir 1996). Reviews of studies of infants with and without disabilities or developmental delays find that child response-contingent behavior and both contingency detection and awareness are associated with a range of different positive child social-emotional consequences (Dunst 2007; Tarabulsky et al. 1996; Watson 1979). Parents as well derive gratification in seeing their young children develop competence (e.g., Miller et al. 2002) and especially where child competence is a direct consequence of efficacious parenting practices (e.g., Goldberg 1977).

Dunst, Raab, and colleagues, as part of a line of research and practice on the response-contingent learning of young children with disabilities and delays, investigated the effects of learning games on the social-emotional behavior of both the children and their parents (Dunst et al. 2007b, c, 2010). The games were characterized by learning opportunities where a child's behavior had a reinforcing consequence (Ware 2016). Results from these studies showed that child contingency learning was correlated with increases in child smiling, laughter, vocalizations, and other social-affective behavior as well as

parent gratification, psychological well-being, and a sense of parenting competence and confidence in response to seeing their children's accomplishments. Parents in these studies smiled in response to and made positive verbal comments about their children's abilities to produce reinforcing consequences and also displayed positive social-affective behavior and made positive verbal comments about their roles in their children's learning. These social-affective behaviors were displayed both in relationship to the child's accomplishments while producing environmental consequences and in terms of an overall sense of parenting competence and psychological well-being. The investigators described these responses as first-order or proximal intervention effects (Dunst et al. 2007c) and second-order or distal intervention effects (Dunst et al. 2010), respectively.

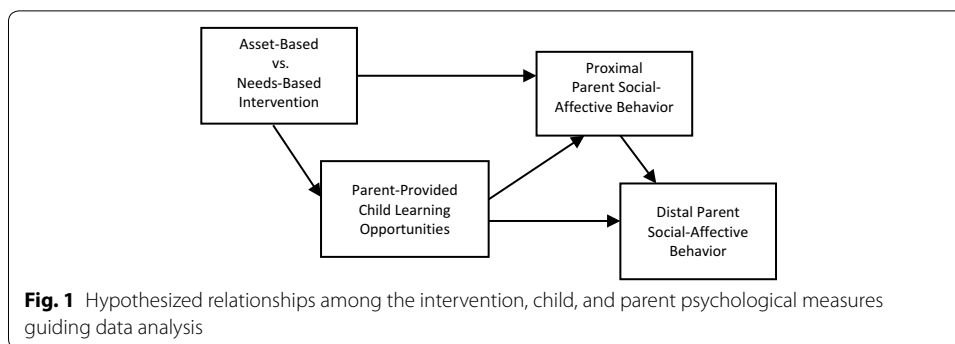
### **Aim of the analyses**

The purposes of the analyses described in this paper were to evaluate the effects of two contrasting approaches to parent-provided child learning opportunities and the direct and indirect effects of the parenting practices on parents' social-affective behavior. The two interventions differed in terms of how child behavior was identified and used to produce reinforcing consequences. One approach used existing child behavior as contingency behavior and the other approach used missing or delayed skills as contingency behavior. These contrasting approaches have been described as asset-based and needs-based approach to early childhood intervention practices, respectively (Eloff and Ebersöhn 2001).

The two approaches differed primarily in terms of the amount of child effort needed to have reinforcing consequences (Lancioni et al. 2001; Ware 2016). Asset-based approaches require minimal effort on the part of a child to use behavior having reinforcing consequences, whereas needs-based approaches require high levels of effort on the part of a child to use behavior having reinforcing consequences. Asset-based approaches to intervention are part of strengths-based (e.g., Buntinx 2013; Sanborn et al. 2015) and capacity-building (e.g., Dunst and Trivette 2009; Swanson et al. 2011) intervention practices. In contrast, needs-based approaches to intervention are part of deficit-based and treatment practices (see, e.g., Dunst 2017; Eloff and Ebersöhn 2001, for descriptions of the characteristics of this approach to intervention). Detailed descriptions of the research design, intervention procedures, and differential effects of the two types of interventions on child learning are reported in Raab et al. (2016, 2017, 2018). The differential effects of the intervention practices on child concomitant and collateral social-emotional behavior are also reported elsewhere (Dunst et al. 2017). This paper includes findings related to the effects of the two types of interventions on parent-provided child learning opportunities and the effects of both child learning and efficacious parenting practices on parent psychological social-affective behavior.

### **Analytic model**

Figure 1 shows the model that was the focus of investigation. The model is based on a converging body of evidence about the relationship between parenting practices and child learning (e.g., Howell 2016; Muir and Hains 1999; Walden 1996; Watson 1981) and the influences of efficacious parenting practices on parent social-affective behavior (e.g., Keller et al. 2003; Seigny and Loutzenhiser 2010; Teti et al. 1996; Umberson



1989). The hypothesized relationships are also based on both lessons learned and results from applied research studies of the value-added benefits of asset-based parenting practices beyond those associated with needs-based parenting practices (e.g., Dunst et al. 1985, 2007a, d).

The two types of parenting intervention practices were expected to be differentially related to changes in child learning opportunities and child contingency behaviors (Crossman 2015; Dunst et al. 2005; McWilliam 2015). Asset-based practices (in contrast to needs-based practices) were hypothesized to be related to increases in parent-provided child learning opportunities where the number of learning opportunities was expected to be associated with increases in the percent of child behavior having reinforcing consequences. Hierarchical linear modeling (Raudenbush et al. 2011) was used to calculate change scores for each child and parent participant where these change scores were used as outcome and mediated measures (Tate 2004) for evaluating the differential effects of the two types of interventions. Changes in child learning were expected to be related to changes in proximal parent positive social-affective behavior where changes in proximal parent social-affective behavior were expected to be related to changes in parents' positive distal social-affective behavior. HLM was also used to compute linear growth curve change scores for both parent measures. The relationships among the slope scores were evaluated using structural equation modeling (Boomsma and Hoogland 2001) with linear growth curve scores (Singer and Willett 2003) of both child and parent behavior as measures of interactive partner functioning. The method of analysis combines measurement of intra-individual change and multivariate structural equation modeling for testing the fit of a hypothesized model to the relationships among the variables in a model (Duncan et al. 2006; Grimm et al. 2017).

In addition to the direct effects among the study variables, we also evaluated a number of mediated effects. Mediated effects help to explain how an intervention variable is indirectly related to an outcome measure through a third intermediate variable (Preacher and Kelley 2001). Type of intervention was hypothesized to be indirectly related to changes in proximal parent social-affective behavior mediated by efficacious parenting practices, and the effects of parent-provided child learning opportunities on distal parent social-affective behavior were expected to be indirect and mediated by changes in proximal parent social-affective behavior. The former relationship is based on research findings on the meditational role of efficacious parenting practices

(e.g., Grégoire et al. 2012; Sanders and Woolley, 2005; Teti et al. 1996), and the latter relationship is based on research findings on the effects of positive parenting practices on parent health and psychological well-being (Dubroja et al. 2016; Nelson et al. 2014; Umberson 1989). The hypothesized relationships and their empirical investigation provide tests of the processes (Bryant et al. 2011) and mediators (Grégoire et al. 2012) of efficacious parenting and their social-emotional consequences as behavior indicators of parent psychological well-being. The mediated tests, in particular, inform the manner in which efficacious parenting practices extend beyond immediate microsettings and involve what Bryant et al. (2011) calls efforts to savor positive experiences that were evaluated in terms of distal social-affective responding in the present study.

## Methods

### Participants

The participants were 71 young children with significant developmental delays and/or multiple disabilities and their primary caregivers randomly assigned to either the asset-based ( $N=38$ ) or needs-based ( $N=33$ ) interventions. The children were eligible for participation in the study if they did not demonstrate the ability to use behavior to produce social or non-social environmental consequences based on baseline assessment results (see below).

The children's etiologies, diagnoses, and causes for their delays or disabilities were quite varied (e.g., cerebral palsy, central nervous system disorders, congenital anomalies). The children were on average 17 months of age ( $SD=4$ ) at the beginning of the study but were functioning, on average, at only 4 months of age developmentally ( $SD=2$ ). The children's average DQ (developmental quotient) was 34 ( $SD=25$ ). The majority of children were functioning between 4 and 5 standard deviations below an average DQ of 100. There were no statistically significant between-intervention-group differences for child chronological age, developmental age, diagnoses or etiologies, or DQ prior to the start of the interventions.

The parent participants were 65 mothers, two fathers, two foster mothers, and two other primary caregivers. The parents were, on average, 32 years of age and had completed an average of 13 years of formal education. The average socioeconomic score of the parents' families was within the low middle class–upper middle class range (Hollingshead 1975). There were no statistically significant between-intervention-group differences for parent age, formal years of education, or family socioeconomic status.

### Procedure

The two interventions differed in terms of how child behavior was identified and selected as contingency game targets to produce or elicit environmental consequences. The children in the asset-based group were observed in their homes and their parents engaged in descriptions of behavior (e.g., head turns, arm and leg movements, vocalizations) that the children displayed but did not use intentionally to produce environmental consequences. The children in the needs-based group were administered a developmental scale to identify delayed or missing skills that were not used by the children to produce environmental consequences.

The parents and early childhood practitioner together identified or developed learning games where a child's actions on the social or non-social environment resulted in a reinforcing consequence (e.g., child head turns from the side to midline position reinforced by a parent kissing the child on the neck; arm or leg movements producing sounds from and movement of a mobile via a ribbon attached to a child's arm or leg and the mobile). All of the learning games were characterized by behavior-based contingencies where a social or non-social environmental consequence was dependent on child behavior responding (Gunnar 1980; Tarabulsky et al. 1996).

The early childhood practitioners made weekly or every other week visits to the families' homes to coach and support the parents' use of the learning games. During the home visits practitioners coded response-contingent behavior while the children were playing the games and parent social-affective behavior both during the games (proximal behavior) and while not playing the games with their children (distal behavior). The learning games were implemented for eight weeks with the children in each intervention group.

The parents played, on average, 4 or 5 games with their children during home visits by the early childhood intervention practitioners. The games were also implemented by the parents on the days between home visits. The parents maintained weekly logs that were used to record the number of games played per day for each week of intervention. The parents in both groups played an average of three games per day on an average of 4–5 days per week. There were no statistically significant between-intervention-group differences for the number of days the parents played learning games with their children per week or the number of games played per day.

### Measures

Early childhood practitioners used investigator-developed recording forms to code the number of learning opportunities (trials) afforded each child per game and to compute the percent of trials per game that were associated with a child response-contingent behavior having an environmental consequence. A trial was defined as the availability of a child reinforcement where a child-specific targeted behavior did or did not result in a social or non-social environmental consequence (e.g., a parent talking to her son or daughter in response to the child smiling at the parent). The two child measures were used to assess parent effort and effectiveness, respectively, where both were used as a latent variable for measuring efficacious parenting practices. Research assistants made 95 joint visits with the practitioners to ascertain interrater agreement over the course of the 8 weeks of intervention. Interrater agreement for number of learning opportunities was 92%, and interrater agreement for the number of child behavior that resulted in reinforcing consequences was 91%.

Investigator-developed rating scales were used to code parent social-affective behavior and verbal comments while the children were engaged in the contingency games (e.g., parent smiling or laughing in response to the child producing environmental consequences; parent making positive verbal comments about the child's accomplishments) and while the children were not playing the contingency games (e.g., parent making positive verbal comments about his/her ability to affect child learning; parent displaying positive affect while describing the child's newly acquired abilities). The items were

originally developed from observations of parents’ responses to child contingency learning and parents’ verbal comments about their children’s newly learned capabilities and their roles in promoting child learning (e.g., Dunst et al. 1985, 1997; Lowe and Dunst 1985). The items were also informed from research by others interested in parents’ social-affective behavior (e.g., Denham 1989; Miklowitz et al. 1989; Telleen et al. 1981).

The two scales each included four items scored on a 5-point scale ranging from occurring *Not-At-All* to occurring *A Great Deal*. Principal components factor analysis of the two sets of ratings at each measurement occasion all produced univariate factor solutions with average internal reliability estimates of  $\alpha = .69$  and  $\alpha = .85$  for the proximal and distal measures, respectively. Research assistants assessed parent social-affective behavior on the same 95 occasions that child response-contingent behavior was coded. Interrater agreement for the four proximal parent affective behavior items was 90%, and interrater agreement for the four distal parent affective behavior items was 95%.

**Data preparation and analysis**

Hierarchical linear growth curve modeling (Raudenbush et al. 2013) was used to compute individual child growth curve (change) scores for the two child contingency learning measures and individual parent growth curve (change) scores for the two social-affective behavior measures. There was an average of 5 (SD = 1.67) longitudinal data points per parent and child across the 8 weeks of intervention. The linear growth curve estimates for both the child and parent measures were computed using the restricted maximum likelihood method (Raudenbush et al. 2011). These change scores are computed using linear regression analysis procedures to estimate growth curves for each participant using available data for computing individual growth curve scores (Singer and Willett 2003). HLM uses a multiple imputation algorithm to estimate values for missing data points (Raudenbush et al. 2011).

Both the child and parent measures showed linear increases across the 8 weeks of intervention. Table 1 shows the average growth curve estimates for the change scores. There were significant linear increases in the number of learning opportunities afforded the children and linear increases in the percent of learning opportunities (trials) associated with a child behavior having a reinforcing consequence. There were also significant increases in both parent social-affective measures across the 8 weeks of intervention.

Structural equation modeling (SEM) (Jöreskog and Sörbom 2014) was used to evaluate the direct effects of the two contrasting types of intervention on changes in

**Table 1 Linear growth curve estimates for the child and parent change scores**

Measures	Slope coefficient	Standard error	t ratio	Degree of freedom	p value
Child change scores					
Number of learning opportunities	2.41	.17	14.14	70	.0000
Parenting efficiency	11.61	.66	17.68	70	.0000
Parent change scores					
Proximal SA behavior	2.58	.07	39.47	70	.0000
Distal SA behavior	1.87	.07	24.98	70	.0000

SA social-affective parent behavior

parent-provided child learning opportunities, and the direct and indirect effects of the asset-based vs. needs-based interventions on changes in parent social-affective behavior mediated by parent-provided child learning opportunities. The two child learning measures were used to construct a latent variable in the SEM.

The fit of the hypothesized model (Fig. 1) to the patterns of relationships among the study variables was evaluated by the root mean square error of approximation (RMSEA), standardized root mean square residual (SRMSR), comparative fit index (CFI), and incremental fit index (IFI). The closer RMSEA and SRMSR are to zero and the closer CFI and IFI are to 1.0, the better the fit of the hypothesized model to the relationships among the variables in the model. The standardized structural coefficients for the direct and indirect effects of the variables in the model were used as sizes of effects for hypothesis testing.

## Results

### Correlational analyses

Table 2 shows the correlations between the two types of interventions and the change scores for the two parent-provided child learning measures and change scores for the two parent social-affective behavior measures. The asset-based intervention (compared to the needs-based intervention) was associated with between group differences in the growth curves for both the number of learning opportunities (trials) afforded the children per game and the percent of parent-provided learning opportunities per game that resulted in child produced or elicited reinforcing consequences. The growth curve change scores for the two child learning measures were correlated with the change scores for both parent social-affective measures. Changes in proximal parent social-affective behaviors were also correlated with changes in distal parent social-affective behavior.

### Fit indices

The tests for closeness of fit of the pattern of relationships among the variables in the model to the hypothesized model (Fig. 1) indicated an adequate fit consistent with the data. RMSEA was .07, SRMSR was .04, CFI was .99, and IFI was .99. The combinations

**Table 2 Correlations between the two types of response-contingent interventions and the growth curve slopes for child learning and parent social-affective behavior**

Study measures	Study measures			
	NLO	PRE	PAB	DAB
Type of intervention <sup>a</sup>	.28*	.30*	.03	.23
Parent-provided child learning measures <sup>b</sup>				
Number of learning opportunities (NLO)	–	.58**	.31*	.34*
Parenting efficiency (PRE)		–	.34*	.49**
Proximal parent SA behavior (PAB)			–	.75**
Distal parent SA behavior (DAB)				–

SA social-affective parent behavior

\*  $p < .01$ . \*\*  $p < .0001$

<sup>a</sup> Asset-based intervention = 1, Needs-based intervention = 0

<sup>b</sup> Per game



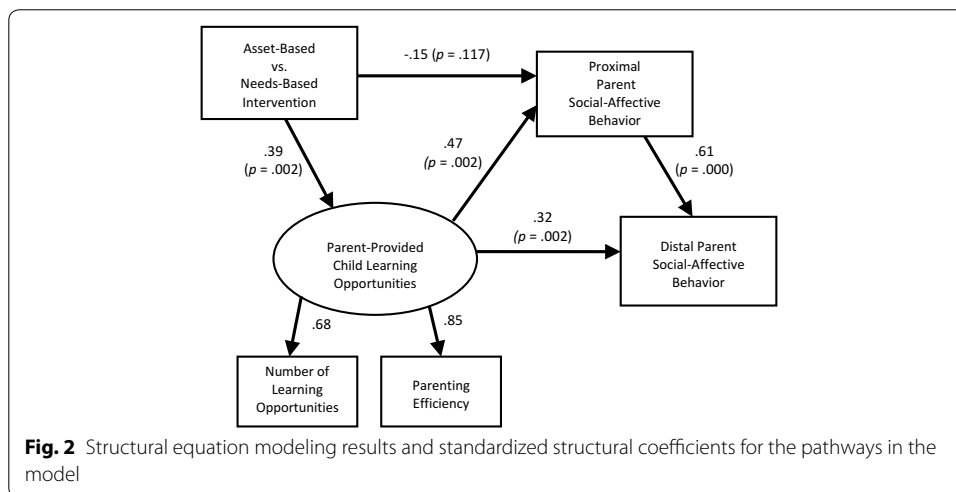
of fit indices all are within the limits recommended by Hu and Bentler (1999) for ascertaining convergence between a hypothesized model and the patterns of relationships in the data.

**Structural equation modeling results**

The structural equation modeling results are shown in Fig. 2. The structural coefficients for the different pathways in the model were all statistically significant except for the pathway between type of intervention and proximal parent social-affective behavior. Type of intervention was directly related to differences in the child growth curve change scores for contingency learning. The slopes for number of child learning opportunities per game were 1.94 (SE = .23) for the asset-based group and 1.09 (SE = .25) for the needs-based group were statistically different,  $t = 2.50, p = .007, \text{Cohen's } d = .59$ . The slopes for the child learning efficiency measure were 9.70 (SE = .93) for the asset-based group and 4.99 (SE = 1.00) for the needs-based group were also statistically different,  $t = 2.72, p = .004, d = .65$ .

Parent-provided child learning opportunities was directly related to both proximal and distal positive parent social-affective behavior. In those instances where parents provided their children more learning opportunities per game and their efforts resulted in more child behavior associated with reinforcing consequences, the parents also manifested more social-affective gratification in response to their children's accomplishments. This gratification was manifested both during the learning games and when the children were not engaged in producing reinforcing consequences.

Type of intervention was indirectly related to proximal parent social-affective behavior mediated by parent-provided child learning opportunities,  $\beta = .39 \times .47 = .18, p = .014$ . Type of intervention was also indirectly related to distal parent social-affective behavior mediated by child learning,  $\beta = .39 \times .32 = .12, p = .023$ , and indirectly related to distal parent social-affective behavior mediated by both child learning and proximal parent social-affective behavior,  $\beta = .39 \times .47 \times .61 = .11, p = .025$ . Child learning was directly related to both parent social-affective behavior measures, and indirectly related to distal



parent social-affective behavior mediated by proximal parent social-affective behavior,  $\beta = .47 \times .61 = .29$ ,  $p = .002$ .

## Discussion

The hypothesized relationships among the variables in the model guiding data analysis (Fig. 1), as well as the hypothesized indirect and mediated effects of both types of intervention and child learning on parents' social-affective behavior, were supported by the SEM findings. The test of the fit of the data to the hypothesized model was confirmatory where pathways in the model were informed by our prior research (e.g., Dunst et al. 2007c, 2010). As noted by MacCullum (1995), "In a 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" (pp. 31). Both conditions were met as evidenced by the fit indices and patterns of relationships between the variables in the model.

Results showed that the asset-based intervention was more effective in terms of growth curve changes in the number of parent-provided child learning opportunities and the efficiency of the learning opportunities. Both child growth curve slopes, which were used as a measure of parenting effectiveness, were related to increases in parents' positive social-affective behavior during the child learning games and while the children were not engaged in playing the games. The results, taken together, provide support for Goldberg's (1977) hypothesis that parenting experiences having positive child consequences can be expected to be related to parents' social-affective gratification. The relationships found in our study are all consistent with models of parent-child interactions that emphasize reciprocal exchanges between and influences of interactive partners on one another (Bronfenbrenner 1977; Gewirtz 1991; Sameroff and MacKenzie 2003).

The findings from the mediated effects of type of intervention and parenting efficacy are consistent with Bryant et al.'s (2011) theory of savoring, and in particular displays of behavior where "positive feelings are primarily perceived as originating within the self" (pp. 108). What we described as distal social-affective parenting behavior are akin to what Bryant et al. (2011) described as positive feelings that are the lingering consequence of successful life experiences which they termed savoring.

The findings provide yet another example of how positive parenting intervention practices focusing on child behavioral assets can have advantageous effects on parent psychological well-being (Dubroja et al. 2016). Asset-based intervention practices (Eloff and Ebersöhn 2001) that focus on behavioral strengths are part of the field of positive psychology that includes the study of which kinds of experiences under which conditions promote and enhance both child and adult well-being (Bryant et al. 2011; Dubroja et al. 2016; Park and Peterson 2003; Seligman et al. 2005). Simple learning games that used existing child behavior as the building blocks for child learning proved effective not only in terms of child benefits but parent benefits as well. As noted by Landry (2014), parental social-affective behavior can be expected to be the consequence of parenting efforts to promote child learning which also functions to sustain child initiations and engagement with the social and non-social environment.

### Parenting effectiveness and psychological well-being

Findings from different studies indicate that parents derive gratification, satisfaction, and enjoyment in their young children's earliest accomplishments (e.g., Koo and Moon 1998; Petrie-Thomas 2003). These types of parental responses are often manifested in terms of smiling, laughter, and positive verbalizations both in terms of child learning and the role parents play in that learning (e.g., Dix 1991; Martin et al. 2002). These particular responses were found to increase at a more rapid rate among parents who implemented the asset-based approach to child contingency learning and are behavior indicators of positive changes in parental psychological well-being (Frederickson and Joiner 2002; Gross and John 2003).

Parenting in general (Nelson et al. 2012, 2014), and parenting a child with a disability in particular (Glidden 2003; Kearney and Griffin 2001; Trute et al. 2007), is more often than not both a rewarding and challenging experience. Nelson et al. (2014), in a review of factors associated with positive and negative parental well-being, found that well-being is enhanced when parenting experiences are associated with positive child outcomes and benefits. The analyses described in this paper illustrate the positive effects of one particular type of family capacity-building intervention practice on parental well-being (Lloyd and Briar-Lawson 2014; Umberson 1989). Both the asset-based intervention and the consequences of this strengths-based practice include nearly all of Seligman's (2011) elements of well-being: positive emotion, parent engagement, parenting accomplishments, and mutually reinforcing parent-child relationships.

### Implications for practice

Asset-based intervention practices in general, and the one described in this paper specifically, are conceptualized as particular types of parenting intervention practice that are intended not only to influence child learning but also to affect changes in parental well-being that is a consequence of efficacious parenting (Duncan et al. 2009; Gewirtz et al. 2009; Tramonte et al. 2015). Positive parenting practices are especially indicated in families of children with disabilities and developmental delays that place primary emphasis on parent-provided child learning opportunities (Bryant et al. 2011; Dyches et al. 2012).

The results reported in this paper and elsewhere (Dunst et al. 2017; Raab et al. 2016, 2017, 2018) provide the foundation for a particular strengths-based approach to early childhood intervention with young children with disabilities and delays, and how using existing behavior as the building blocks for contingency learning not only benefits the children but their parents and other primary caregivers as well. The approach is especially indicated in situations where a child has not yet demonstrated the intentional use of behavior to produce or elicit reinforcing consequences.

There are also implications in terms of strengthening parent and caregiver practices. As noted in the introduction, a parent's use of practices that are efficacious in terms of affecting child learning is dependent, in part, on his or her recognition of the fact that the parent was the agent of child learning. This recognition, called parenting mindfulness (Cohen and Semple 2010), is a necessary condition for continued use of practices to affect changes in child learning and behavior. Early childhood practitioners who are knowledgeable of the fact that proximal and distal parent social-emotional responding

are behavior indications of not only well-being but also indicators of mindfulness when a parent recognizes and acknowledges his or her role in child learning can use observations of those indicators to reinforce parenting confidence and competence.

### Limitations of the study

A number of limitations are briefly mentioned to place the study and asset-based contingency intervention practice in proper perspective. One limitation is the fact that we investigated only one type of asset-based intervention; namely contingency learning games. Whether different asset-based practices would have similar effects needs to be investigated (see, e.g., Swanson et al. 2011). A second limitation has to do with the fact that we did not investigate whether early contingency learning affects the development of other behavior competencies. It may, therefore, be the case that the effects of the intervention are limited in terms of its development-instigating characteristics (Bronfenbrenner 1992).

### Authors' contributions

CJD and MR were involved in the conceptualization, design, and conduct of the study as well as the preparation of this paper. DWH conducted the data analysis reported in the paper. All authors read and approved the final manuscript.

### Competing interests

The authors declare that they have no competing interests.

### Availability of data and materials

Raw data are held by the authors. Data for this paper are reported in Tables 1 and 2.

### Ethics approval and consent to participate

The study described in this paper and elsewhere (Dunst et al. 2017; Raab et al., 2016, 2017, 2018) was reviewed and approved by the investigators' Research Institute Review Board (IRB) in accordance with U.S. Department of Health and Human Services; National Institutes of Health IRB human subjects ethical guidelines. Informed parent consent was also obtained according to NIH IRB guidelines and standards.

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