

Effect of Interest-Based Interventions on the Social-Communicative Behavior of Young Children with Autism Spectrum Disorders

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The effects of incorporating the interests of young children with autism spectrum disorders into early intervention practices on the social and communicative behavior of the children was examined in a meta-analysis of 14 single participant design studies including 30 infants, toddlers, and preschoolers. Results showed that the interest-based interventions had positive effects on the children's affect, social responses, joint attention, and language outcomes. Findings also showed that different ways of incorporating the interests of the children into early intervention practices had similar effects. Implications for practice are described.

Children with autism spectrum disorders almost always manifest difficulties with social, communication, and interpersonal relationships (Jones & Carr, 2004; Kabot, Masi, & Segal, 2003; Lord & Bishop, 2009). This has been attributed, in part, to the limited interests of the children which is believed to interfere with the acquisition of social-communicative behavior and competence (Baron-Cohen, 2004; Mandy & Skuse, 2008). For the most part, interventions have focused on decreasing the limited interests of children with autism spectrum disorders while at the same time promoting social behavior (e.g., Gresham, Beebe-Frankenberger, & MacMillan, 1999; Lewis & Bodfish, 1998). Evidence is emerging, however, to suggest that incorporating the interests of children with autism spectrum disorders into interventions with the children might have positive effects and consequences (e.g., Boyd, Alter, & Conroy, 2005).

In one of the first demonstrations of an interest-based intervention with children with autism, Koegel, Dyer, and Bell (1987) found that engaging 4- to 13-year-old children with autism spectrum disorders in child-preferred activities resulted in discernible decreases in social avoidance behavior. In a study by Martin and Farnum (2002) of 3 to 16-year-old children with autism spectrum disorders, introducing unfamiliar, novel animals into the children's intervention sessions resulted in more social and less stereotypical behavior compared to the use of noninterest-based materials. Similar results have been reported in other studies including children both younger and older than six years of age with autism spectrum disorders (e.g., Elefant & Wigram, 2005; Sigafos, Laurie, & Pennell, 1995).

The purpose of the meta-analysis described in this paper was to determine the effectiveness of interest-based interventions with young children with autism spectrum disorders 2 to 6 years of age. One goal was to integrate available evidence on a novel and promising practice to determine if interest-based practices are warranted as an intervention for young children with autism spectrum disorders. A second goal was to determine if different ways of incorporating interests into early intervention practices had similar or dissimilar effects and to determine the conditions under which the practices were most effective in terms of influencing the behavior of young children with autism spectrum disorders. The studies in the meta-analyses included only children 6 years of age and younger since recent advances in the early assessment of autism spectrum disorders now make it possible to diagnose the disorder long before the behavioral markers associated with the disorder become firmly established (Barbaro & Dissanayake, 2009; Rogers, 2000). This in turn makes it possible to intervene early in the children's lives to promote social and early communicative competence (Dunst, 2011; Wallace & Rogers, 2010).

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Definition of Interests

Kapp, Hidi and Renninger (1992) differentiate between two types of interests (personal and situational) which were used to code and analyze the interest-based interventions in the studies included in the meta-analysis. *Personal interests* refer to the personal characteristics of an individual that engages him or her in preferred or enjoyable activities (Renninger, 2000). Young children, for example, demonstrate personal interests in terms of preferences for certain objects, activities, and actions; prolonged attention to and engagement with people, objects, and events; positive social-affective behavior (e.g., smiling and laughing) while engaged in preferred activity; and by choosing to interact or play with particular people or objects. *Situational interests* refer to the characteristics of a child's social or nonsocial environment that evoke engagement with people or material. This includes the interestingness of people, objects, activities, etc. that evoke and sustain attention and sustained engagement (Chen, Darst, & Pangrazi, 2001). The situational interests of young children include, but are not limited to, sights and sounds that evoke attention; the characteristics and features of objects, materials or toys that invite engagement; children's initiations in response to salient events; and responses to violations of expectations.

Search Strategy

Studies were located using *autism* or *autist** or "*autism spectrum disorder*" or "*rett syndrome*" or *asperger** or *asperger syndrome*" or *PDD AND interest* or *excit** or *motivate** or *entertain** or *preference* or *preferred* or *favorite* or "*choice-mak** or *pref* object*" or "*preferred object** or *preferred-object** AND *treatment* or *therapy* or *intervention* or "*inter*therapy*" or *treat*therapy* AND *infant* or *infancy* or *toddler* or *preschool** as search terms. Both controlled vocabulary and natural language searches were conducted (Lucas & Cutspec, 2007). The search sources included PSYCHINFO, ERIC, MEDLINE, CINAHL, Academic Search Premier, Education Research Complete, and Rehabdata. These were supplemented by Google Scholar, Scirus, and Ingenta searches as well as a search of an EndNote Library maintained by our Institute. Hand searches of the reference sections of all retrieved journal articles, book chapters, books, dissertations, and unpublished papers were also examined to locate additional studies. Studies were included if the children were 6 years of age or younger; the studies included intervention and nonintervention conditions or contrasts; and the effects of interest-based interventions on child behavior outcomes were the focus of the investigation.

Search Results

Fourteen studies were located that included 30 children diagnosed with autism spectrum disorders (Baker, 2000; Baker, Koegel, & Koegel, 1998; Carter, 2001; Finnigan & Starr, 2010; Kern, Wolery, & Aldridge, 2007; Koegel, Ca-

marata, Valdez-Menchaca, & Koegel, 1998; Koegel, Singh, & Koegel, 2010; Koegel, Camarata, Koegel, Ben-Tall, & Smith, 1998; Koegel, Vernon, & Koegel, 2009; Lorimer, Simpson, Myles, & Ganz, 2002; Moes, 1998; Vismara & Lyons, 2007; Wiggins, 2009). All of the studies were single participant design investigations. The sample sizes in the studies ranged between 1 and 4 (Median = 3). The mean child age of the children was 52 months (Range = 26 to 72). The mean developmental age of the children was 32 months (Range = 14 to 61). Twenty-three children were male (77%) and seven children were female (23%). Severity of the children's disorders was reported in five studies and estimated based on information included in eight research reports. The children were diagnosed with mild (N = 11), moderate (N = 15), mild to moderate (N = 3) or severe (N = 3) autism spectrum disorders.

The interest measures used by the investigators were described as narrow, ritualistic, obsessive, circumscribed, preservative, or situational interests. Interests were also described and measured in terms of child preferences (e.g., preferred vs. non-preferred objects) or child choices (e.g., choice vs. no choice). The definitions of personal and situational interests described in the introduction were used to code the type of child interest used in each study. Studies were coded as using personal interests if a child interest assessment was conducted prior to the interventions and the children's preferences, likes, desires, etc. were incorporated into the interventions to affect changes in child outcomes. Studies were coded as using situational interests if novel or highly salient materials were incorporated into the interventions to affect changes in child outcomes.

The social-communication outcomes in the studies included measures of child positive affect, interests, social play, social engagement, social initiations, and imitation which were categorized as child social behavior. These were coded into two subcategories: Positive affect (including child interests) and social engagement (play, initiations, imitation). The outcomes also included child vocalizations, verbalizations, joint attention, and turn taking which were all categorized as child communication behavior. These were coded into two subcategories: Language and joint attention (including turn taking). A number of investigators assessed the absence of the above behavior as negative child outcomes which were used as proxy measures of social-communication behavior by reversing the effect sizes for the relationship between the interventions and outcome measures.

The intra-individual point-biserial correlation coefficient was used as the effect size of the relationship between the interest-based interventions and the social-communicative child outcomes (Marsh, 1982). The codes for the baseline (= 0) and intervention (= 1) phases of the study were correlated with the dependent measures obtained during both phases of the study to ascertain the effects of the interventions. The average correlation between the intervention and outcome measures was used as the estimate for the size of

effect between measures. The 95% confidence intervals (CI) for the average sizes were used for substantive interpretation of the findings. A 95% CI not including zero indicates that the average effect size differs significantly from zero at the $p < .05$ level (Rosenthal, 1994). An effect size between 0.10 and 0.24 is considered small, an effect size between 0.25 and 0.39 is considered medium, and an effect size equal to or greater than 0.40 is considered large (Dunst & Hamby, in press; Lipsey & Wilson, 2001).

Synthesis Findings

The average effect size for the influence of the interest-based interventions on all outcomes combined was 0.80 (95% CI = 0.75 - 0.86). Figure 1 shows the relationships between the interventions and the four-sub categories of outcomes constituting the focus of investigation. The result shows that the interventions were significantly related to all of the outcome measures as evidenced by confidence intervals not including zero. This set of findings, taken together, indicated that incorporating the interests of young children with autism spectrum disorders into early intervention practices had positive effects on the children's social-communicative behavior.

Figure 2 shows the relationship between the types of interests incorporated into the children's interventions and both the social and communication child outcomes. Incorporating either type of child interest into the interventions had positive consequences on both categories of child outcomes. However, the strength of the relationships between the interest-based interventions and child social behavior was stronger for personal compared to situational interests. In contrast, both personal and situational interests had similar effects on child communication behavior. The former can be discerned from the minimal overlap in the confidence intervals for the two types of interest-based interventions. The large confidence interval for the communication outcomes is an indication that there were considerable variations in the

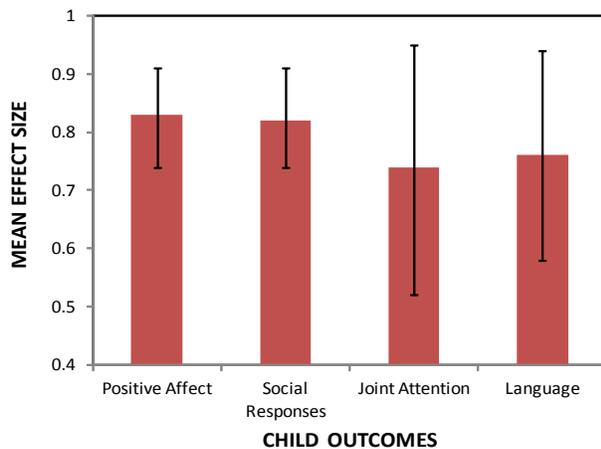


Figure 1. Average effect sizes and 95% confidence intervals for the relationship between the interest-based interventions and the child outcomes.

relative effectiveness of the two types of interest-based interventions on this particular child outcome.

Whether or not the interest-based interventions were similarly effective for children who differed in their ages was evaluated by a tripartite split of child age into three age ranges and calculating the average effect size for the relationship between child age groupings and the child outcome measures. The results are shown in Figure 3. The interventions were effective regardless of child age but were more effective for children who were 45 months of age or older.

The extent to which the relationships between the interventions and the child outcomes were moderated by child gender, severity of child delay or intervention setting are shown in Table 1. Neither child gender nor severity of the children's delays differentially influenced the effects of the interventions on the study outcomes. The interventions were also similarly effective regardless of the settings where the interventions were implemented.

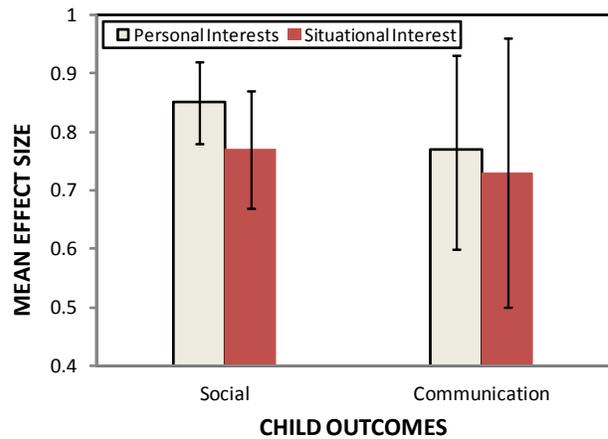


Figure 2. Average effect sizes and 95% confidence intervals for the influence of personal and situational interests on the child outcomes.

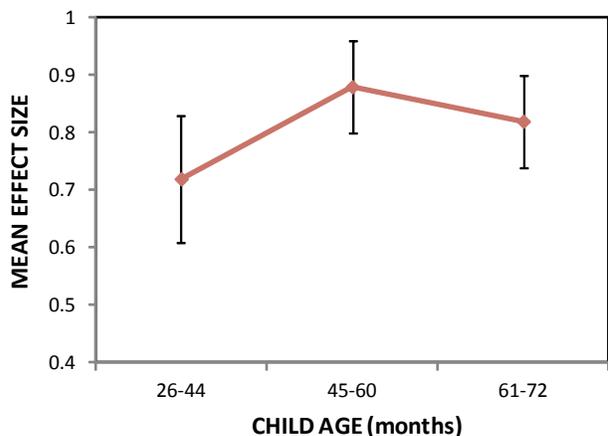


Figure 3. Average effect size and 95% confidence intervals for the relationship between child age at time of the interventions and the study outcomes.

Table 1
Average Effect Sizes and 95% Confidence Intervals for the Influence of Child Characteristics and Intervention Setting on the Study Outcomes

Moderators	Number of Effect Sizes	Average Effect Size	95% Confidence Intervals
<i>Child Gender</i>			
Male	42	.81	.75-.87
Female	13	.78	.63-.92
<i>Child Severity</i>			
Mild	26	.82	.74-.90
Moderate/Severe	29	.78	.71-.86
<i>Intervention Setting</i>			
Home/Community	11	.88	.78-.97
Classroom	19	.80	.69-.91
Clinic	25	.77	.69-.85

Discussion

Results showed that incorporating the interests of young children with autism spectrum disorders into early intervention practices has positive effects on the children's social-communicative behavior. The findings also showed a trend showing that incorporating the personal interests of the children into the interventions had more positive effects on the children's social behavior compared to the use of situational interests for engaging young children with autism spectrum disorders in social-communicative interactions with adult and peers.

The findings reported *CELLreview* add to the data in this base about the role and importance of interest-based learning opportunities for children with and without disabilities (Dunst, 2011; Dunst, Jones, Johnson, Raab, & Hamby, 2011; Dunst & Raab, 2011; Mandy & Skuse, 2008; Raab & Dunst, 2007; Schraw & Lehman, 2001). According to Bronfenbrenner (1992), interests can function as either an individual or environmental factor shaping and influencing child engagement in interactions with others that in turn affects child behavior and competence. Therefore, incorporating interests into interventions with young children with autism spectrum disorders (e.g., Trivette & Dunst, 2011) would seem warranted as a practice for positively influencing child behavior and competence in general (e.g., Dunst, Trivette, & Masiello, 2011; Swanson, Raab, Roper, & Dunst, 2006) and social-communicative competence more specifically (Boyd et al., 2005; Dunst, 2011).

Implications for Practice

Nearly all of the *CELL Practice Guides* were explicitly developed so that they included either or both personal and situational interest features (www.earlyliteracylearning.org). A number of different guidelines are now available that specifically include methods and procedures for incorporating

the interests of young children with autism spectrum disorder into early intervention practices with the children.

Dunst (2011) developed a model and set of practices for identifying the personal interests of young children with autism spectrum disorders and using those interests to engage the children in everyday activities providing children opportunities to practice existing skills, acquire new competence, and develop a sense of mastery as a result of engaging in interest-based learning opportunities. The main focus of interventions is to promote and strengthen parents' or practitioners' capacity to increase the number, frequency, and variety of child participation in development-instigating interest-based activities where parents or practitioners use naturalistic teaching procedures (Dunst, Raab, & Trivette, 2012) to support existing child competence as well as promote acquisition of more developmentally advanced behavior.

Boyd et al. (2005) describes an approach to incorporating the interests of young children with autism into early intervention practices that focuses on the use of either or both personal and situational interests. The model includes methods for identifying both types of interests, identifying behavioral objectives (including but not limited to social-communicative competencies), and procedures for embedding the children's interests into either or both formal and informal learning activities and opportunities.

The method most often used for incorporating situational interests into learning opportunities for young children with autism spectrum disorders is child choice making among different materials, toys, or activities (e.g., Carter, 2001; Reinhartsen, Garfinkle, & Wolery, 2002). This approach typically involves the presentation of a number of different objects or activities to a child that have either or both preferred features or salient characteristics where a child has the opportunity to choose preferred toys, materials, or activities.

There are now quite a few assessment tools and procedures for identifying the interests of infants, toddlers, and preschoolers, including young children with autism spectrum disorders or other kinds of disabilities (e.g., Dunst, Roberts, & Snyder, 2004; King et al., 2004; Moss, 2006; Raab, Swanson, Roper, & Dunst, 2006; Rugg & Stoneman, 2004; Stangel, 1970; Swanson et al., 2006). Any of these should prove useful for identifying a child's interests, promoting increased child participation in interest-based activities, and increasing a child's social-communication competence. The reader is referred to Dunst, Jones et al. (2011) and Raab and Dunst (2007) for studies that have identified and incorporated the interests of young children into formal and informal learning opportunities and activities which include descriptions of different kinds of interest assessment methods and procedures.

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Appendix A

Background Characteristics of the Study Participants

Study	Sample Size	Chronological Age (months)		Developmental Age (months)		Child Gender		Child Diagnosis ^a	Severity
		Mean	Range	Mean	Range	Male	Female		
Baker (2000)	2	67	65-68	47	36-57	2	0	Autism	Moderate
Baker et al. (1998)	1	64	-	42		0	1	Autism	Moderate
Carter (2001)	2	65	64-66	46	43-50	0	2	Autism	NR (Moderate)
Finnigan & Starr (2010)	1	44	-	18	-	0	1	Autism	Severe
Fleming (2008)	1	48	-	NR	-	1	0	Autism	NR (Moderate)
Kern et al. (2007)	2	40	38-41	NR	-	2	0	Autism	Mild-moderate
L. Koegel et al. (1998)	3	52	45-65	18	15-20	2	1	Autism	NR (Moderate)
R. Koegel et al. (1998)	4	61	44-72	41	30-53	3	1	Autism	NR (Moderate)
Koegel et al. (2009)	3	39	38-41	19	17-21	3	0	Autism	NR (Mild)
Koegel et al. (2010)	3	58	51-61	NR	-	3	0	Autism	NR (Mild)
Lorimer et al. (2002)	1	60	-	45	-	1	0	Autism	Mild-Moderate
Moes (1998)	1	70	-	61	-	1	0	Autism	NR (Mild)
Vismara & Lyons (2007)	3	33	26-38	16	14-18	3	0	Autism	NR (Moderate)
Wiggins (2009)	3	48	-	NR	-	2	1	Autism Spectrum Disorder	NR (Mild)

^aDiagnosis of the children as reported by the study investigators.

NOTE. Severity in parentheses indicates that degree of delay was estimated based on information in the research reports.

Appendix B

*Research Designs, Child Interest and Outcome Measures,
and the Intra-Individual Point-Biserial Correlation Effect Sizes*

Study	Research Design	Interest Measure	Child Outcome Measures	Child	Effect Size
Baker (2000)	Multiple baseline design	Ritualistic interests	Social play	C1	.80
			Joint attention	C1	.89
			Positive affect	C1	.83
			Social play	C2	.96
			Joint attention	C2	.96
			Positive affect	C2	.88
Baker et al. (1998)	Multiple baseline design	Obsessive interests	Social play	C1	.97
			Positive affect	C1	.84
Carter (2001)	ABAB	Restricted choice	Social play	C1	.75
			Engagement	C1	.45
			Social play	C2	.25
			Engagement	C2	.99
Finnigan & Starr (2010)	AB ₁ B ₂	Situational interests	Social approach	C1	.71
			Child imitation	C1	.88
			Child turn-taking	C1	.94
			Social behavior ^a	C1	.45
Flemming (2008)	AB	Choice	Social Play	C1	.73
Kern et al. (2007)	ABAB	Situational interests	Social approach	C1	.18
			Social approach	C2	.45
L. Koegel et al. (1998)	Multiple baseline design	Preferred objects	Child questions	C1	.87
			Child questions	C2	.87
			Child questions	C3	.96
R. Koegel et al. (1998)	Multiple baseline design	High interest objects	Child language	C1	.82
			Child language	C2	.97
			Child language	C3	.85
			Child language	C4	.88
Koegel et al. (2009)	ABAB	Child preferred objects	Social engagement	C1	.98
			Positive affect	C1	.81
			Social engagement	C2	.90
			Positive affect	C2	.91
			Social engagement	C3	.90
Koegel et al. (2010)	Multiple baseline design	Child preferred objects	Positive affect	C3	.87
			Social behavior ^a	C1	.65
			Child interest	C1	.86
			Social behavior ^a	C2	.93

Appendix B, continued.

Study	Research Design	Interest Measure	Child Outcome Measures	Child	Effect Size
Koegel et al. (2010)	Multiple baseline design	Child preferred objects	Child interest	C2	.91
			Social behavior ^a	C3	.78
			Child interest	C3	.96
Lorimer et al. (2002)	ABAB	Situational interests	Verbalizations ^a	C1	.74
			Social behavior ^a	C1	.54
Moes (1998)	ABAB	Choice making	Social behavior ^a	C1	.52
			Positive affect	C1	.81
Vismara & Lyons (2007)	AB ₁ B ₂ C	Preservative interests	Joint attention	C1	.77
			Positive affect	C1	.79
			Joint attention	C2	.87
			Positive affect	C2	.54
			Joint attention	C3	.44
Wiggins (2009)	ABAB	Preferred objects	Positive affect	C3	.43
			Social behavior	C1	.97
			Social behavior	C2	.97
			Social behavior	C3	.97
			Social behavior	C3	.97

^aProxy measure for social-communication behavior.