

Supplemental Information on the Early Social Interaction Project

The Early Social Interaction (ESI) Project is a comprehensive early intervention approach developed for toddlers with autism spectrum disorder (ASD) and their families incorporating evidence-based active ingredients consistent with requirements of the Individuals With Disabilities Education Act (IDEA) Part C early intervention program. This supplemental information provides details on the ESI model and the Social Communication, Emotional Regulation, and Transactional Supports (SCERTS) curriculum-based assessment and intervention model. Video illustrations of ESI, SCERTS, and many other commonly used interventions for children with ASD can be found in the Treatment section of the ASD Video Glossary available online.

The ESI model incorporates the following features:

Family-centered approach. A family-centered approach addresses the family's needs, concerns, and priorities throughout the assessment and intervention process. Respecting family members' perceptions, priorities, and preferences, developing active participatory and relational partnerships, and building capacity and unity are key components of an effective family-centered program. Families are more involved in the achievement of goals when they have been stakeholders in their development.

Learning in natural environments. Natural environments are defined in IDEA Part C as the everyday activities, routines, and settings typical for any

family, including their home, child care, and community locations such as the park or grocery store. Everyday activities such as mealtime, play, caregiving, and family chores provide authentic opportunities to embed teaching of objectives that are functional to the activity and therefore naturally support acquisition and generalization of the skills. Individual coaching of families to embed evidence-based intervention strategies throughout the day requires interventionist and parent consideration of the sequence, ease of strategy use, and frequency of opportunity within various activities. Group parent education meetings and playgroups including families of young typical children also offer a natural environment for family members of children with ASD to get information and support.

Collaborative coaching to support parent learning and generalization.

Individual intervention sessions are organized to build parent capacity to engage in their children's learning and include updating session plan, practicing supports and strategies in 3 to 5 different activities, problem solving, and planning for ongoing intervention between sessions. A 4-step collaborative coaching model based on adult learning research is used: (1) identify what works, with direct teaching if needed; (2) guided practice with parent in an active role, provide feedback; (3) caregiver-led practice and reflection with feedback; and (4) interventionist back-

out for caregiver independence. The interventionist coaches the caregiver in each new activity at the first level and moves to level 4 as quickly as possible to promote caregiver competence, confidence, and independence. Coaching in a variety of everyday activities promotes generalization of caregiver learning so the caregiver can support the child's learning throughout the day as planned or as opportunities arise.

Developmental framework to prioritize child outcomes.

ESI uses SCERTS, a manualized curriculum-based assessment and intervention framework, to identify goals and objectives and monitor progress (Prizant, Wetherby, Rubin, Laurent, & Rydell, 2006). The acronym *SCERTS* refers to Social Communication (SC), Emotional Regulation (ER), and Transactional Support (TS), which are the primary developmental dimensions targeted to support the development of children with ASD and their families. The SCERTS curriculum-based assessment includes parent report and observation forms administered in the child's home with the family to identify high-priority goals and objectives. Assessments are updated quarterly. The SC and ER domains delineate specific, measurable goals and objectives for the child and are organized by communication stage, beginning with children who are in the Social Partner Stage, before the development of any words. The TS domains delineate specific, measurable goals and objectives for the parent or other communicative partners

and include teaching strategies and learning supports that are selected to help the child meet his or her individualized goals and objectives. Social communication targets for toddlers with ASD include expanding the use of gestures, sounds, and words, initiating spontaneous verbal and nonverbal communication, understanding the meaning of words, initiating and responding to joint attention, increasing functional object use and pretend play, and extending reciprocity in interaction. Emotional regulation targets for toddlers with ASD include being available for learning and expressing emotion, expanding self-regulatory strategies to calm self when dysregulated, using communication to help regulate emotion when frustrated or help is needed, and using regulatory strategies to stay engaged in activities and handle new and changing situations. SC and ER targets are integrated to prevent the development of problem behavior, consistent with positive behavior support.

Systematic instruction using evidence-based strategies.

Children with ASD can learn from everyday activities and experiences when learning opportunities are structured and systematic techniques are used to foster active engagement. ESI incorporates systematic instruction using evidence-based behavioral strategies that are developmentally sensible for toddlers. Ongoing monitoring with corresponding adjustments in programming is based on observational data collected within activities. Parents learn to use intervention strategies matched to the priority objectives within daily activities to increase opportunities for teaching and learning whenever the activity occurs.

Intensity needed for children with ASD.

The intensity needed for children with ASD is achieved through the integration of the core features of ESI. Parents partner with professionals to plan an individualized, developmentally sensible

intervention program using SCERTS to address the impact of the child's autism symptoms on learning. Professionals coach parents on how to competently and systematically use intervention strategies throughout the day in typical activities where the skills are meaningful for the child. This process of embedding strategies in everyday activities is designed to support parent implementation of 25 hours/week of active child engagement. Although the intensity of intervention necessary to provide optimal outcomes is not yet determined for infants and toddlers at risk for ASD, research suggests that more time spent in active, positive engagement results in better outcomes for preschoolers. A minimum of 25 hours per week of active engagement in intervention has been recommended as soon as children are suspected of having ASD. This approach provides a way to maximize intensity of intervention and reduce professional time.

REFERENCE

Prizant BM, Wetherby AM, Rubin E, Laurent AC, Rydell PJ. *The SCERTS Model: A Compre-*

hensive Educational Approach for Children With Autism Spectrum Disorders.

Baltimore, MD: Brookes Publishing; 2006

SUPPLEMENTAL TABLE 3 Child Outcome Measures and Linear Mixed Model Results With F Values

	Child Outcome Measures						Linear Mixed Model Results									
	Individual-ESI			Group-ESI			Time (Across Condition)			Time × Condition						
	M	SE	Δ	95% CI	M	SE	Δ	95% CI	F	p	Hedges's g	CLES	F	p	Hedges's g	CLES
Communication and Symbolic Behavior Scales																
Social Composite	59.4	3.8	22.3	15.5 to 29.1	51.9	3.9	12.4	5.5 to 19.3	50.61	<.001	0.76	0.70	4.14	.04	0.48	0.63
Speech Composite ^a	1.4	0.1	0.7	0.5 to 0.9	1.3	0.1	0.8	0.6 to 1.0	98.06	<.001	1.27	0.82	0.06	.81	0.05	0.51
Speech Composite ^b	42.1	3.8	33.7	24.9 to 42.6	34.0	4.1	27.5	18.4 to 36.6	—	—	—	—	—	—	—	—
Symbolic Composite	52.6	3.6	28.9	21.5 to 36.3	48.6	3.8	27.0	19.4 to 34.6	75.02	<.001	1.28	0.82	0.13	.72	0.13	0.54
Autism Diagnostic Observation Schedule																
Social Affect	10.9	0.7	-2.6	-3.8 to -1.4	12.3	0.7	-2.1	-3.4 to -0.9	30.38	<.001	-0.51	0.36	0.27	.61	0.15	0.54
RRB	3.4	0.3	0.4	-0.2 to 1.0	3.6	0.3	0.7	0.1 to 1.4	6.87	.01	0.38	0.61	0.63	.43	0.17	0.55
Vineland Adaptive Behavior Scales																
Communication	90.2	2.2	11.8	7.7 to 15.9	82.9	2.3	3.1	-1.0 to 7.3	26.01	<.001	0.50	0.64	8.76	.004	0.69	0.69
Daily Living	91.0	1.7	4.2	0.2 to 8.1	85.0	1.8	-2.5	-6.5 to 1.5	0.34	.56	0.07	0.52	5.62	.02	0.58	0.66
Socialization	84.1	1.5	-0.9	-4.1 to 2.5	81.2	1.5	-5.6	-9.0 to -2.3	7.31	.008	-0.31	0.41	4.18	.04	0.66	0.68
Motor	88.8	1.6	-5.5	-8.8 to -2.2	87.6	1.6	-8.4	-11.8 to -5.0	34.21	<.001	-0.69	0.31	1.51	.22	0.34	0.59
Adaptive Behavior Composite	86.2	1.6	2.2	-1.0 to 5.5	81.7	1.6	-3.3	-6.7 to 0.0	0.21	.65	-0.14	0.46	5.66	.02	0.72	0.69
Mullen Scales of Early Learning																
Visual Reception	42.1	2.2	-0.1	-4.2 to 4.0	39.2	2.2	-1.2	-5.4 to 2.9	0.21	.65	-0.04	0.49	0.15	.70	0.03	0.51
Fine Motor	37.2	2.0	-9.0	-13.1 to -5.0	37.7	2.1	-4.7	-8.8 to -0.7	22.80	<.001	-0.57	0.34	2.18	.14	0.41	0.61
Receptive Language ^a	1.6	0.0	0.1	0.1 to 0.2	1.5	0.0	0.0	0.0 to 0.1	16.10	<.001	0.41	0.61	7.46	.008	0.58	0.66
Receptive Language ^b	39.5	2.2	10.1	6.2 to 14.1	34.1	2.3	2.8	-1.2 to 6.8	—	—	—	—	—	—	—	—
Expressive Language ^a	1.6	0.0	0.1	0.1 to 0.2	1.5	0.0	0.1	0.0 to 0.1	26.52	<.001	0.54	0.65	0.27	.61	0.18	0.55
Expressive Language ^b	39.0	2.2	9.0	4.7 to 13.3	36.2	2.2	7.5	3.3 to 11.8	—	—	—	—	—	—	—	—
Early Learning Composite	81.7	3.3	5.9	0.2 to 11.6	76.2	3.4	2.1	-3.7 to -7.9	3.80	.06	0.20	0.56	0.85	.36	0.13	0.54

Estimated marginal means are presented. CI, confidence interval; CLES, Common Language Effect Size; Δ, mean change from baseline to end of intervention. CLES, which is derived from the g effect, represents the likelihood that a randomly selected child from the individual-ESI group will show greater improvement than a randomly selected child from the group-ESI group.

^a Estimated marginal means, SEs, and linear mixed model results using log transformed variables.

^b Estimated marginal means and SEs presented using nontransformed variables.