Method for the Systematic Reviews on Occupational Therapy and Early Intervention and Early Childhood Services

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Systematic reviews of literature relevant to early intervention and early childhood services are important to the practice of occupational therapy. We describe the five questions that served as the focus for the systematic reviews of the effectiveness of occupational therapy interventions in early intervention and early childhood services. We include the background for the reviews; the process followed for each question, including search terms and search strategy; the databases searched; and the methods used to summarize and critically appraise the literature. The final number of articles included in each systematic review; a summary of the themes of the results; the strengths and limitations of the findings; and implications for practice, education, and research are presented.


Since 1998, the American Occupational Therapy Association (AOTA) has instituted a series of evidence-based practice (EBP) projects to assist members with meeting the challenge of finding and reviewing the literature to identify evidence and, in turn, using this evidence to inform practice (Lieberman & Scheer, 2002). Following the evidence-based philosophy of Sackett, Rosenberg, Muir Gray, Haynes, and Richardson (1996), AOTA’s projects are based on the principle that the EBP of occupational therapy relies on the integration of information from three sources: (1) clinical experience and reasoning, (2) preferences of clients and their families, and (3) findings from the best available research.

A major focus of AOTA’s Evidence-Based Practice Project is an ongoing program of systematic review of the multidisciplinary scientific literature, using focused questions and standardized procedures to identify practice-relevant evidence and discuss its implications for practice, education, and research. Systematic reviews of early intervention and early childhood research strengthen current knowledge of the efficacy of practices used by occupational therapy practitioners in services for young children.

Background

Occupational therapy services in early childhood are provided to infants, toddlers, and preschoolers with a developmental delay or disability. These services are provided through Parts B and C of the Individuals With Disabilities Education Improvement Act of 2004 (IDEA; Pub. L. 108–446), a U.S. federal law that governs how states and public agencies provide early intervention, special education, and related services to children with disabilities. The Program for
Infants and Toddlers With Disabilities (Part C of IDEA) is a federal grant program that assists states in operating a comprehensive statewide program of early intervention services for infants and toddlers with disabilities, ages birth through 2 yr, and their families. Services are also provided to infants and toddlers who are at risk for developmental delay (Workgroup on Principles and Practices in Natural Environments, 2008). Preschool services are provided through IDEA Part B, Section 619, and mandate that special education and related services are designed to meet the specific learning needs of eligible children with disabilities.

Early intervention services are frequently provided by medical systems, and hospitals often are the first place an infant receives occupational therapy intervention. For example, neonates who experience medical complications (e.g., prematurity, intraventricular hemorrhage, apnea, physiological and respiratory instability) typically receive developmental care and medical support in the neonatal intensive care unit, where they may reside for weeks or months (Hunter, 2010). When discharged, preterm or medically involved infants may continue to receive assessment and monitoring through hospital-based neonatal follow-up clinics or home health agencies (Dudgeon & Crooks, 2010). Early intervention services through medical systems differ from those provided by community-based programs. For example, interdisciplinary teams that provide hospital-based early intervention services are typically managed by physicians or nurses; are funded by insurance or Medicaid; focus on the infant’s health, nutrition, and medical problems in addition to developmental progress; and follow individualized health plans (Dudgeon & Crooks, 2010). Interdisciplinary teams in community-based early intervention programs are typically managed by therapists or teachers, are primarily funded by state agencies, focus on the infant’s developmental performance and preacademic skills, and are guided by individualized family service programs and individualized education programs (Blackman, 2002; Hanft & Pilkington, 2000). Across systems, the focus of occupational therapy practitioners is to provide family-centered, developmentally appropriate services that enhance and accelerate the young child’s physical and social play performance and increase his or her participation in home and school routines.

Best practice in early childhood programs is characterized as collaborative, family-centered, and responsive services that meet the diverse needs and priorities of children and their families (Dunst et al., 2001; Sandall, Hemmeter, Smith, & McLean, 2005; Workgroup on Principles and Practices in Natural Environments, 2008). In addition, researchers have advocated that early childhood services incorporate Contextually Mediated Practice™, defined as the “provision of interest-based child learning opportunities as part of everyday family and community activities by parents (and other primary caregivers) where parent responsiveness and encouragement are used to support child learning and the development of socially-adaptive, functional capabilities” (Dunst, 2006, p. 2). These concepts of best practice and the development of specific skills in early childhood are consistent with occupational therapy practice. Occupational therapy practitioners working in early childhood provide occupation- and activity-based interventions to children to increase participation in all areas (physical, social–emotional, cognitive, communication, and self-care). Interventions are often provided in the child’s natural learning environment to ensure that optimal learning and development take place.

An evidence-based perspective is founded on the assumption that scientific evidence of the effectiveness of occupational therapy intervention can be judged to be more or less strong and valid according to a hierarchy of research designs, an assessment of the quality of the research, or both. AOTA uses standards of evidence modeled on those developed in evidence-based medicine. This model standardizes and ranks the value of scientific evidence for biomedical practice using the following grading system adapted from Sackett et al. (1996): 

- **Level I:** Systematic reviews, meta-analyses, randomized controlled trials
- **Level II:** Two groups, nonrandomized studies (e.g., cohort, case control)
- **Level III:** One group, nonrandomized (e.g., before and after, pretest and posttest)
- **Level IV:** Descriptive studies that include analysis of outcomes (e.g., single-subject design, case series)
- **Level V:** Case reports and expert opinion that include narrative literature reviews and consensus statements.

This study was initiated and supported by AOTA as part of the Evidence-Based Practice Project. In 2007, a Representative Assembly (RA) motion was passed “to charge the President to direct the Executive Director to direct resources to conduct an evidence-based literature review on the effectiveness of Occupational Therapy Services and Early Intervention” (AOTA, 2007). The RA charge reflected the need for occupational therapy practitioners to access findings from systematic reviews to support interventions within the scope of occupational therapy practice. In addition, the rationale for the RA charge was the increased incidence of childhood disorders and an interest in addressing barriers to early intervention occupational therapy services.
Four focused questions were initially developed for the systematic reviews of occupational therapy interventions for early intervention and early childhood services and included questions related to social–emotional development; feeding, eating, and swallowing; preliteracy; and service delivery models. The questions were generated in conjunction with a group of content experts in early intervention and early childhood and EBP. Because of budget constraints, the project was put on hold until 2009. After the results of the search were reviewed and the literature summaries were developed, the preliteracy question was divided into two questions, one examining intervention effects on motor outcomes and the other examining interventions that promote cognitive development.

The following five focused questions from the review of interventions for children ages birth to 5 yr are addressed in special issue articles (Case-Smith, 2013; Case-Smith, Frolek Clark, & Schlabach, 2013; Frolek Clark & Schlabach, 2013; Howe & Wang, 2013; Kingsley & Mailloux, 2013):

1. **Social–emotional development**: What is the evidence for the effectiveness of interventions used by occupational therapy practitioners to promote social–emotional development of children with or at risk for disabilities, ages birth to 5 yr?
2. **Feeding, eating, and swallowing**: What is the evidence for the effectiveness of interventions used in occupational therapy to improve feeding, eating, and swallowing for children from birth to age 5?
3. **Motor development**: What is the evidence for the effectiveness of interventions within the scope of occupational therapy to improve motor performance in children birth to age 5 yr?
4. **Cognitive development**: What is the evidence for the effectiveness of interventions within the scope of occupational therapy practice to improve cognitive development in children birth to age 5 yr?
5. **Service delivery model**: What is the evidence for the effectiveness of different service delivery models and methods used in occupational therapy services for young children and their families?

### Method

Search terms for the reviews were developed by the consultant to the AOTA Evidence-Based Practice Project and AOTA staff in consultation with the authors of each question and were reviewed by the advisory group. The search terms were developed not only to capture pertinent articles but also to make sure that the terms relevant to the specific thesaurus of each database were included. Table 1 lists the search terms related to the populations and interventions included in each systematic review. A medical research librarian with experience in completing systematic review searches conducted all searches and confirmed and improved the search strategies.

Databases and sites searched included Medline, PsycINFO, CINAHL, ERIC, and OTSeeker. In addition, consolidated information sources, such as the Cochrane Database of Systematic Reviews and the Campbell Collaboration, were included in the search. These databases are peer-reviewed summaries of journal articles and provide a system for clinicians and scientists to conduct evidence-based reviews of selected clinical questions and topics. Moreover, reference lists from articles included in the systematic reviews were examined for potential articles, and selected journals were hand searched to ensure that all appropriate articles were included.

Inclusion and exclusion criteria are critical to the systematic review process because they provide the structure for the quality, type, and years of publication of the literature incorporated into a review. The review of all five questions was limited to peer-reviewed scientific literature published in English. Reports listed in ERIC were included for the service delivery question. The literature included in the review had been published since 1990, and the study samples were children birth to age 5 who were eligible for early intervention services. The intervention approaches examined were within the scope of practice of occupational therapy. The review excluded data from presentations, conference proceedings, non–peer-reviewed research literature, dissertations, and theses. Studies included in the review provided Level I, II, and III evidence. Level IV evidence was included only when higher level evidence on a given topic was not found.

A total of 10,676 citations and abstracts were included in the reviews. The question on social–emotional development had 5,823 references; the feeding, eating, and swallowing question resulted in 1,147; the service delivery model question had 500; and the motor and cognitive questions yielded 3,206 citations and abstracts. The first author of this article (Marian Arbesman) completed the first step of eliminating references on the basis of citations and abstracts. Then the reviews were carried out as academic partnerships in which academic faculty worked with graduate students to carry out the reviews, except in one situation in which the author worked on the review independently. Review teams completed the next step of eliminating references on the basis of citations and abstracts. The full-text versions of potential articles were retrieved, and the review teams determined final inclusion in the review on the basis of predetermined inclusion and exclusion criteria.
Table 1. Search Strategy for Systematic Reviews on Early Intervention and Early Childhood Services

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<th>Category</th>
<th>Key Search Terms</th>
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<tr>
<td>Population</td>
<td>Infant development, infant (newborn), infant (premature), infants, preschool children, toddlers, young children</td>
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<tr>
<td>Intervention: social–emotional development</td>
<td>Affective attunement, attachment, attachment behavior, coping, coping skills, developmentally supportive care, DIR/Floortime, early childhood development (can include neonatal and infant development), early childhood play behavior, emotional development, family-centered care, family relations, individualized developmental care, infant care, infant massage, infant mental health, kangaroo care, mental health, mother–child relations, neonatal development, NIDCAP, occupational therapy, parent training, parental support, parent–child relations, parenting, parenting skills, pivot training, play, relationship-based interventions, routines-based interventions, self–regulation, sensorimotor/sensory motor, sensorimotor/sensory motor development, sensory integration, sensory integrative, social–emotional, synactive model of infant behavior</td>
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<td>Intervention: feeding, eating, swallowing</td>
<td>Bottle feeding, breast feeding, breast feeding positions, caregiver/infant interaction during feeding, chewing, cup drinking, dysphagia, eating behavior, feeding, feeding and eating disorders of childhood, feeding difficulties, feeding habits, feeding problems, feeding readiness, finger feeding, food refusal, food textures, infant nutrition, infant nutritional physiological phenomena, lactation, mealt ime routines, mealtimes, nonnutritive sucking, oral feeding, oral motor stimulation, oral sensorimotor, oral support, prefeeding oral stimulation, positioning during feeding, seating, suck, sucking/swallowing coordination, swallowing</td>
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<tr>
<td>Intervention: motor and cognitive</td>
<td>Activities of daily living, adaptive equipment, alphabet exposure, alphabet principle, assistive technology, attention, auditory processing, childhood play behavior, cognitive processing, computer games, computers, early childhood intervention, early intervention, early literacy, fine motor, fine motor skill learning, games, gross motor, gross motor skill learning, hand skills, handwriting, haptic perception/training, imitation skills, imitative behavior, joint attention, kinesthetic perception/training, language, manipulation skills, motor activity, motor processes, name writing, nonverbal, occupational therapy, perceptual learning, perceptual motor learning, perceptual motor processes, phoneme, phonemic awareness, physical development, play, play and playthings, postural balance, postural control, posture, pre-emergent writing, print awareness, problem solving, psychomotor, psychomotor performance, reading, rhythm, self-care, sensation, sensory integration, sensory processing, shared reading, shoulder control, signing, sign language, skill learning, sound awareness, space perception, spatial ability, transition, visual motor, visual perception, visual perceptual skills, visual spatial ability, Wii</td>
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<tr>
<td>Intervention: service delivery models</td>
<td>Activities-based, at-risk children, center-based, coaching, consultation, deficit model, developmentally appropriate practices, direct service, distributed learning, early childhood education, ecocultural model, ecocultural theory, ecological model, family centered, home visiting, home visits, iatrogenic effects, inclusion, inclusion (combined with preschool), integrated model, interdisciplinary, monitoring, natural environments, natural learning environment, NICU follow-up, parent-centered, parent family adaptation, routines based, service coordination, service delivery, strengths based, transdisciplinary, transdisciplinary teaming</td>
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A total of 112 articles were included in the final review. Table 2 presents the number and levels of evidence of articles included for each review question. The teams working on each focused question reviewed the articles according to their quality (scientific rigor and lack of bias) and levels of evidence. Each article included in the review was then abstracted using an evidence table that provides a summary of the methods and findings of the article and an appraisal of the strengths and weaknesses of the study on the basis of design and methodology. AOTA staff and the Evidence-Based Practice Project consultant reviewed the evidence tables to ensure quality control.

Summary of Themes in the Review

The results of the systematic reviews published in this issue of the American Journal of Occupational Therapy provide guidance for occupational therapy practitioners working in early intervention and early childhood. By reviewing the scientific literature and appraising and synthesizing specific studies, the authors have been able to provide guidance on critical practice questions.

In the area of social–emotional development, evidence was found in the following areas: touch-based interventions such as kangaroo care and massage; relationship-based interventions that focus on strategies to improve adult–child interaction; joint attention strategies to improve the ability to share attention when engaged in an activity; interventions that promote peer-to-peer engagement; and instruction-based interventions, such as social skills training, Social Stories™ and social scripts, and therapist-
selected toys and objects that promote social interactions. In the area of feeding, eating, and swallowing, the interventions were categorized by themes into behavioral, parent-directed and educational, and physiological interventions.

The evidence for interventions to improve cognitive development in young children was grouped under two themes: developmental interventions in the neonatal intensive care unit, home, and natural environment and joint attention interventions. In the area of motor performance in early childhood, evidence was found in the following areas: developmental interventions for at-risk children, motor interventions for children at risk or with cerebral palsy, and visual–motor interventions for young children with developmental delays. The systematic review on service delivery found evidence in the following themes: routine-based intervention; home, community, and natural settings; and parent education and interventions focusing on parent–child relationships.

Strengths and Limitations of the Review and Implications for Practice, Research, and Education

The five systematic reviews presented in this issue (Case-Smith, 2013; Case-Smith et al., 2013; Frolek Clark & Schlabach, 2013; Howe & Wang, 2013; Kingsley & Mailloux, 2013) have several strengths and include many aspects of occupational therapy practice for infants, toddlers, and young children and their families. The reviews included 112 articles, and three-fourths of the articles provide Level I and Level II evidence, indicating that the evidence is of high quality. The reviews also involved systematic methodologies and incorporated quality control measures.

The limitations of the systematic reviews are based on the design and methods of individual studies and include small sample sizes and limited descriptions of the psychometric properties of a study’s outcome measures. In addition, many of the studies in the review included concurrent interventions, and separating the effects of a single intervention may be difficult. Please refer to the individual systematic reviews for more complete information on the results, interpretation of findings, limitations, and implications for practice (Case-Smith, 2013; Case-Smith et al., 2013; Frolek Clark & Schlabach, 2013; Howe & Wang, 2013; Kingsley & Mailloux, 2013).

These systematic reviews provide summaries of the best scientific literature available to answer the focused questions. The results described here can be directly integrated into clinical practice by combining the scientific evidence with clinical expertise and client preferences. In addition, this information may be used when advocating for occupational therapy services to a payer or regulator or providing information and support to a client and family member at any point during the intervention process.

In the future, researchers should build on the existing studies discussed in the systematic reviews included in this issue. Clearly, more work is needed to definitively answer the five questions that served as the basis of these systematic reviews. Although some future research can be conducted in isolation, research questions in the areas of early intervention and early childhood are often complex and may best be answered through collaborative research with other disciplines working with infants, toddlers, and young children, such as education; speech and language pathology; physical therapy; psychology; and medical specialties such as pediatrics, pediatric neurology, and developmental pediatrics.

The future of occupational therapy is based on all occupational therapy practitioners developing a firm grasp of the best available evidence. This agenda is also clear for academic programs training the next generation of occupational therapy practitioners. Educators need to be aware of the results of these systematic reviews and present this multifaceted information to students rather than focus on a favored type of intervention. In addition, the evidence should not be presented in a one-size-fits-all framework but should be discussed from a client-centered and occupational-based perspective as described in the Occupational Therapy Practice Framework: Domain and Process (2nd ed.; AOTA, 2008). ▲

References

Dudgeon, B. J., & Crooks, L. (2010). Hospital and pediatric rehabilitation services. In J. Case-Smith & J. C. O’Brien...


