
Parental or Teacher Education and Coaching to Support Function and Participation of Children and Youth With Sensory Processing and Sensory Integration Challenges: A Systematic Review

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This systematic review examines the literature published from January 2007 through May 2015 related to the effectiveness of occupational therapy interventions using parental or teacher education and coaching with children with challenges in sensory processing and sensory integration (SP–SI). Of more than 11,000 abstracts and 86 articles that were considered, only 4 met the criteria and were included in this review. Studies of parental training and coaching for children with challenges in SP–SI and comorbid autism spectrum disorder have suggested that educational or coaching programs could result in positive outcomes for both parents and children, often in a relatively short time period. Recommendations include a greater focus on providing educational interventions for parents and teachers and including specific assessment of SP–SI before implementing interventions meant to address those issues. Specific recommendations for future research are provided.

Miller-Kuhaneck, H., & Watling, R. (2018). Parental or teacher education and coaching to support function and participation of children and youth with sensory processing and sensory integration challenges: A systematic review. *American Journal of Occupational Therapy*, 72, 7201190030. <https://doi.org/10.5014/ajot.2018.029017>

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Children with challenges in sensory processing and sensory integration (SP–SI) demonstrate differences in participation in daily activities, academics, play, and leisure compared with children without SP–SI difficulties (Bar-Shalita, Vatine, & Parush, 2008). Research has documented an association between having SP–SI challenges and functional limitations in adaptive behavior, executive functions, and occupational performance across multiple contexts (Adams, Feldman, Huffman, & Loe, 2015; Ben-Sasson, Carter, & Briggs-Gowan, 2009; Lane, Young, Baker, & Angley, 2010). These functional difficulties and the accompanying behavioral concerns in turn increase the demands on those caring for children with challenges in SP–SI, particularly children with comorbid autism spectrum disorder (ASD; Bagby, Dickie, & Baranek, 2012; Dickie, Baranek, Schultz, Watson, & McComish, 2009; Schaaf, Toth-Cohen, Johnson, Outten, & Benevides, 2011). These difficulties may extend into the school environment, where inclusion of children with SP–SI challenges, whether isolated or comorbid with ASD, may be problematic for teachers (Ashburner, Ziviani, & Rodger, 2008; Barnhill, Polloway, & Sumutka, 2011; Brock, Huber, Carter, Juarez, & Warren, 2014). Parents and teachers, therefore, must be skilled at managing these difficulties, and occupational therapy practitioners must be able to provide appropriate training and interventions to assist them.

Family-centered care (FCC) is often considered best practice because families play the primary role in fostering a child's development (King, Williams, & Hahn Goldberg, 2017; Kuo et al., 2012). In addition to offering interventions aimed at

ameliorating deficits in child performance, FCC includes noting and promoting child and family strengths and sharing information with caregivers (Kuo et al., 2012). However, many parents who raise a child with a disability report having needs that are not met by the varied health care providers they encounter (Kogan et al., 2008). Moreover, parents have reported dissatisfaction because of difficulties obtaining desired information and displeasure with discussions about their child's development or behavior that lack thorough description and detail (Houtrow, Kim, Chen, & Newacheck, 2007; Lushin & O'Brien, 2016; MacKean, Thurston, & Scott, 2005; Olson et al., 2004; Raspa et al., 2015; Schuster, Duan, Regalado, & Klein, 2000). Parents of children with SP-SI difficulties have also reported a desire to develop a better understanding of their child's behavior and to learn supportive strategies to be able to help their child (Cohn, Miller, & Tickle-DeGnen, 2000).

To fill this gap in services, an important function of occupational therapy services for children with challenges in SP-SI is the identification and use of appropriate methods to help teach parents and teachers to (1) learn about and understand their child's difficulties, (2) improve specific areas of deficit in their child's performance that are of concern to them, (3) use or maximize child strengths, and (4) maintain their own health and wellness (American Occupational Therapy Association [AOTA], 2014). Such methods may include training parents, teachers, or both in specific strategies or coaching.

The difference between training and coaching lies in both the methods and the focus. *Training* is led by a professional, usually with a preestablished curriculum, and results in the parent or teacher directly and independently translating knowledge to provide services to the child. In contrast, *coaching* is a collaborative process that uses observations, action, reflection, and feedback (Rush & Shelden, 2005) to help parents or teachers develop awareness, knowledge, and skill that enables and empowers them to design their own solutions to meet the child's needs (King et al., 2017).

Generally, the literature has supported the use of parent training and parent-mediated interventions for altering child behavior, and some evidence has shown that parent training programs can also improve parent stress, well-being, mental health, and self-efficacy as well as parent-child interaction (Barlow, Smailagic, Ferriter, Bennett, & Jones, 2010; Barlow, Smailagic, Huband, Roloff, & Bennett, 2014; Bearss et al., 2015; Furlong et al., 2013; Lee, Niew, Yang, Chen, & Lin, 2012; Lundahl, Risser, & Lovejoy, 2006; Miller Kuhaneck, Madonna, Novak, & Pearson, 2015; Oono, Honey, & McConachie, 2013; Zwi, Jones, Thorgaard, York, & Dennis, 2011). Similarly, research has supported

coaching models to help parents and teachers achieve desired goals (Baldwin et al., 2013; Dunn, Cox, Foster, Mische-Lawson, & Tanquary, 2012; Fettig & Barton, 2014; Foster, Dunn, & Lawson, 2013; Graham, Rodger, & Ziviani, 2009, 2013, 2014; King, 2009; Missiuna et al., 2012; Schwellnus, King, & Thompson, 2015). However, much of this research has focused on children with attention deficit hyperactivity disorder (ADHD), ASD, or significant behavioral problems. Although many children in these groups have SP-SI challenges (Dunn & Bennett, 2002; Mangeot et al., 2001; Marco, Hinkey, Hill, & Nagarajan, 2011; Yochman, Parush, & Ornoy, 2004), they are not always quantified or documented in the research.

To best support families and teachers involved in the daily care of children with challenges in SP-SI, occupational therapy practitioners need appropriate evidence to guide practice. The purpose of this systematic review is twofold:

1. To examine the literature regarding interventions that involve training or coaching parents or teachers of children and youth with SP-SI difficulties to provide occupational therapy practitioners with evidence to support their decision making
2. To provide therapists with information to guide interventions that involve training or coaching for parents or teachers of children with SP-SI difficulties to promote the child's development and growth.

This review analyzes the available research regarding parent-teacher coaching or training specifically for children with challenges in SP-SI to answer the question, "What is the efficacy of occupational therapy interventions that use education or coaching with parents or teachers to support participation for children and youth who have challenges in processing and integrating sensory information that interfere with participation in everyday life?"

Method

This systematic review is part of AOTA's Evidence-Based Practice (EBP) Project related to sensory integration (SI) and sensory processing (SP). A previous review, covering 1986-2006, focused on neuroscientific underpinnings of sensory challenges, subtypes of SP dysfunction, functional difficulties related to areas of occupational performance, evidence regarding SI interventions, and evidence related to nonsensory interventions (Schaaf & Davies, 2010). The four systematic reviews published in this issue (see also Parham & Bodison, 2018; Pfeiffer, Frolek Clark, & Arbesman, 2018; Schaaf, Dumont, Arbesman, & May-Benson, 2018) examine the literature published from January 2007 through May 2015 and address four

questions, each focused specifically on an aspect of intervention for children with SP–SI difficulties. In addition, they apply the criterion that participants in all included studies had a documented deficit in SP or SI. This criterion aimed to ensure that the interventions examined in the reviews were judged only when applied to recipients who demonstrated a need for a sensory-focused intervention.

Search terms were developed by the methodology consultant to the AOTA EBP Project and AOTA staff in consultation with all authors contributing to the reviews and an advisory group of content experts. The search terms were developed to capture pertinent articles and to ensure that the terms relevant to the specific thesaurus of each database were included. The search was built on the search strategy from the original 1986–2006 review (see Arbesman & Lieberman, 2010) with inclusion of additional terms such as *family coping*, *FCC*, and *parent/teacher mediated* to ensure maximum coverage of the current review questions. A separate search specific to children with ASD began with the search completed for the AOTA-sponsored systematic review for children with ASD covering 2007–2013 (Tomchek & Patten Koenig, 2016), repeating the search to cover the literature from 2013 to May 2015.

Intervention approaches were within the scope of practice of occupational therapy and addressed services for children and adolescents with challenges related to SP–SI as determined by either (1) an assessment confirming that the targeted intervention population had challenges in SP–SI or (2) outcome measures that assess SP–SI. The review excluded data from presentations, conference proceedings, non-peer-reviewed research literature, dissertations, and theses. Studies included in the review are Level I, II, and III evidence. For a full description of all search terms, see Parham and Bodison (2018) in this issue. A medical research librarian with experience in completing systematic review searches conducted all searches and confirmed and improved the search strategies.

Inclusion and exclusion criteria were carefully developed to address the quality, type, and years of publication of the literature that was incorporated into the review. To be included in this review, articles needed to be peer-reviewed scientific literature published in English between January 2007 and May 2015. More specifically, to be included, articles needed to report on an intervention using an education or coaching strategy delivered to parents or teachers of children ages birth–21 yr who had identified challenges in processing and integrating sensory information as determined systematically by a formal assessment process. Moreover, the parent or teacher ed-

ucation or coaching needed to result in an intervention for the child that in some way addressed the identified sensory concerns or sensory-related behaviors. Articles could include both parent- and child-focused outcomes but had to include at least child-focused outcomes.

Databases and sites searched were MEDLINE, PsycINFO, CINAHL, ERIC, and OTseeker, as well as consolidated information sources, such as the Cochrane Database of Systematic Reviews. In addition, reference lists from articles included in the review were examined, and selected journals were hand searched to ensure that all appropriate articles were included.

The consultant to the EBP Project completed the first step of eliminating references on the basis of citation and abstract. The review team, consisting of two academic faculty and two graduate students, completed the next step of eliminating references on the basis of citations and abstracts. The full-text versions of potential articles were retrieved and evaluated by the authors according to the predetermined inclusion and exclusion criteria to identify appropriate articles. A total of 11,619 citations and abstracts were identified for review: MEDLINE, 3,255; CINAHL, 2,642; ERIC, 2,465; PsycINFO, 1,319; OTseeker, 1,500; and Cochrane Database, 438. After removing duplicates ($n = 205$), screening titles of all remaining articles ($n = 11,414$), and including 1 paper found through other sources ($n = 1$), 86 full-text articles were considered for inclusion. Specifics of the review process are detailed in Figure 1.

Both authors reviewed and abstracted each article identified for inclusion in the review using an evidence table to summarize the methods and findings. AOTA staff and the EBP project consultant reviewed the evidence table to ensure quality control. All studies are summarized in full in Supplemental Table 1 (available online at <http://otjournal.net>; navigate to this article and click on “supplemental”). Included articles were evaluated according to their quality (scientific rigor and lack of bias) and level of evidence. The risk of bias of individual studies was assessed using the methods described by Higgins, Altman, and Sterne (2011) and is outlined in Supplemental Table 2 (available online). The strength of the evidence was based on the guidelines of the U.S. Preventive Services Task Force (2016) using the classifications of insufficient, mixed, limited, moderate, and strong.

Results

Stringent inclusion and exclusion criteria were applied to ensure that reviewed studies included documentation of challenges in processing and integrating sensory information among child participants. Of more than 11,600

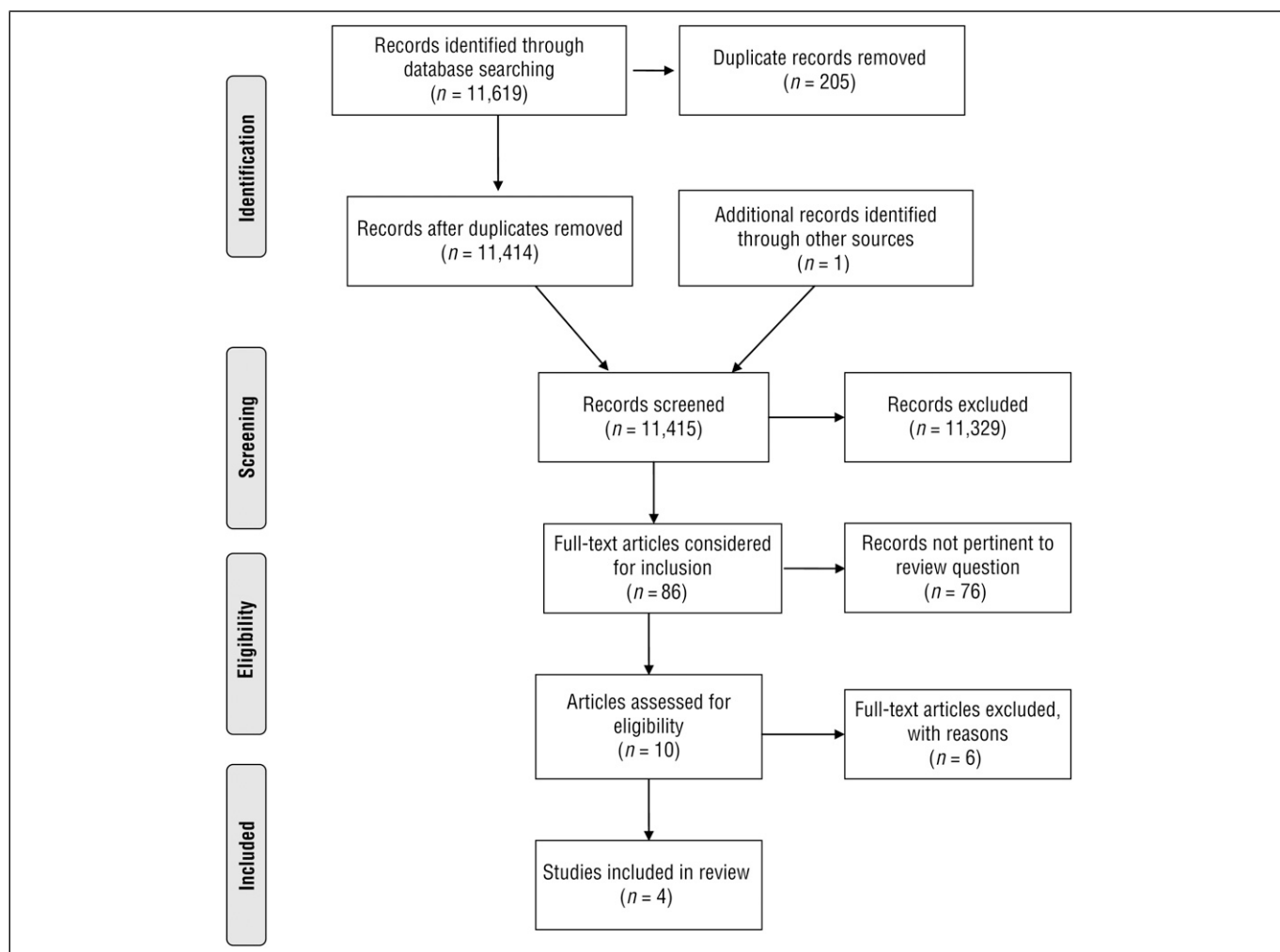


Figure 1. Review process flow diagram.

Figure format from “Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement,” by D. Moher, A. Liberati, J. Tetzlaff, and D. G. Altman; The PRISMA Group, 2009, *PLoS Medicine*, 6(6), e1000097. <https://doi.org/10.1371/journal.pmed.1000097>

abstracts and 86 articles considered, only 4 met the criteria and were included in this review. These 4 articles consisted of 2 Level I studies (Silva, Schalock, & Gabrielsen, 2011; Woo & Leon, 2013), 1 Level II study (Rogers et al., 2014), and 1 Level III study (Dunn et al., 2012). Using the family-oriented services framework described by King et al. (2017), the articles included in this review reported services falling in two of six categories: information resources ($n = 0$), education services ($n = 0$), training and instruction services ($n = 2$; Silva et al., 2011; Woo & Leon, 2013), support groups ($n = 0$), psychosocial services (coaching is included in this category, according to this framework; $n = 2$; Dunn et al., 2012; Rogers et al., 2014), and service coordination ($n = 0$).

Interventions included those that focused on parenting skills, parent–child interaction, parent–child play, family routines and contexts, specific parent-performed somatosensory strategies, and sensory–motor enrichment in the home. Some interventions specifically focused on sensory enrichment, sensory–motor activities, or alterations to sen-

sory aspects of context ($n = 3$), and others used training in relation to child responses to sensory aspects of play or activities as one part of an overall training package focused on parent–child interaction ($n = 2$).

All 4 articles reported improvements on either child or parent measures. Outcome measures included parent ($n = 3$) and child ($n = 4$) outcomes. The most consistently reported improvements were in parental stress or distress ($n = 2$) and child performance or behaviors ($n = 3$). Other findings included parents being able to implement interventions with fidelity ($n = 1$), improved child self-regulation ($n = 1$), and improved parental self-efficacy ($n = 1$).

In all studies, parents were the focus of the education and the persons who delivered interventions to their children. No articles that met the inclusion criteria focused on training of teachers. The coaching or training programs for parents and the resultant child intervention were, not surprisingly, most often provided in the home.

In all cases, the included articles involved parents of children with ASD or who were at high risk for ASD.

There were no articles that focused on children with SP–SI without comorbid ASD. In 2 of the articles (Dunn et al., 2012; Silva et al., 2011), SP–SI concerns were strongly documented using a thorough sensory assessment. In the other 2 articles, SP–SI concerns were minimally assessed through items on measures of ASD (Rogers et al., 2014; Woo & Leon, 2013).

Parent training time ranged from 3 hr to more than 18 hr. Total child intervention time was not always quantified because parents embedded the strategies into their natural routines as they occurred. Children also attended community or typical educational interventions during these studies, making it even more difficult to quantify total intervention time.

Discussion

This review sought to determine the efficacy of parent training and coaching for parents of children with SP–SI difficulties in order to improve the children’s participation. Although 100% of the articles reviewed reported positive outcomes, the strength of the evidence is insufficient because so few articles met the inclusion criteria for this review, and clear themes were difficult to identify. The inclusion criteria for assessment of participants’ SP, although important, led to the exclusion of many articles.

For example, 1 article that addressed educating parents to improve sleep through the use of sensory strategies as part of the intervention (Austin, Gordon, & O’Connell, 2013) was excluded because there was no formal assessment of sensory functioning to guide the provision of those sensory strategies. In addition, 2 articles included in the review had minimal assessment of participants’ SP at the outset via an assessment of ASD with items about atypical sensory reactions. However, these tools are not designed to provide a thorough assessment of a child’s sensory functions. Clearly, one primary finding of this review is the lack of thorough assessment of SP–SI difficulties even in studies of participant groups that are known to have a high rate of these issues and in studies using strategies meant to manage them. This strict guideline, although limiting for this review, is necessary to ensure that studies of interventions meant to address SP–SI difficulties include children who actually have such challenges. Many previous reviews related to SP–SI have not required that participants be thoroughly evaluated for SP–SI before being provided with an intervention.

Although providing training and education for parents is undoubtedly an important role for the pediatric occupational therapist working with children with challenges in SP–SI, to date the occupational therapy profession has made minimal

contribution to the literature supporting its efficacy in this role. However, there are preliminary indications that carefully structured parental training or coaching along with parent-implemented strategies can result in positive outcomes after fairly minimal hours of educational time, suggesting an efficient and financially viable method of intervening for some families.

One study (Rogers et al., 2014) suggested that parents may learn to provide intervention strategies with fidelity with as little as 8 hr of training, and multiple articles reported some improvements after only 12–18 hr of parent training. Given the frequent limitations imposed on direct occupational therapy services by third-party payers and the logistics of staffing or context, parent-implemented intervention, when provided after careful occupational therapy training or coaching, may offer an efficient and effective approach to service delivery.

In some cases, the extended service delivery that occurs through parent-implemented intervention may allow for greater improvements in child outcomes and improved parent outcomes than is seen with more typical rates of occupational therapy service delivery. For example, 1 article (Woo & Leon, 2013) demonstrated what the authors reported to be clinically meaningful changes in autism-related behaviors after just 6 mo of intervention provided by parents 2 times per day. Clinicians working with children with SP difficulties should be attentive to opportunities to provide parents with training or coaching to address their concerns. The literature has documented the benefits of parent training and coaching for other client populations (those with ADHD, ASD, and conduct disorder) for improving child behavior and parent outcomes (Barlow et al., 2010, 2014; Bearss et al., 2015; Furlong et al., 2013; Lee et al., 2012; Lundahl et al., 2006; Miller Kuhaneck et al., 2015; Oono et al., 2013; Zwi et al., 2011).

All of the articles included in this review provided training or coaching to parents of children with ASD. There may be multiple reasons for this finding. First, parents of children with ASD report many challenges in parenting their children (Bagby et al., 2012; Dickie et al., 2009; Schaaf et al., 2011), so the focus of studies with this group may merely indicate addressing an identified need in the community. Second, valid and reliable methods for diagnosing ASD are readily available (Cervantes, Matson, & Goldin, 2016; Daniels, Halladay, Shih, Elder, & Dawson, 2014), facilitating the ability to identify participants meeting this criterion for inclusion in studies. Thus, the greater number of studies involving participants with ASD may be a response to methodological considerations such as having distinct participant groups.

Third, many studies of parent training and coaching attempt to deal with child behavior problems (Bearss et al., 2015; Furlong et al., 2013; Lee et al., 2012). Because children with ASD often exhibit difficult behaviors, focusing studies on this diagnostic group may reflect the practice of including participants whose clinical characteristics tend to be in line with this form of intervention. Finally, the extreme and rapid growth in the prevalence of ASD has been met with increased research funding specifically for this diagnosis (Dawson, 2013; Park, Harwood, Yu, Kavanagh, & Lu, 2016); therefore, the amount of research in ASD may merely reflect the priorities of the nation in responding to this public need.

Implications for Occupational Therapy Research

Multiple research needs can be identified from this review:

- Research on parent and teacher training and coaching via occupational therapy professionals, focused on childhood occupations and participation broadly with all pediatric populations
- Specific research on parent and teacher training and coaching for parents and teachers of children with challenges in SP–SI, with careful measurement of those issues to guide the interventions
- Continued research regarding parent and teacher needs and desires for specific content and methods of training and coaching
- Research regarding the specific mechanisms or characteristics of training programs that enhance their effectiveness, specifically the efficacy of online methods of parent and teacher training
- Longitudinal research that examines the long-term impacts of parent and teacher training and coaching models.

The literature review for this article identified few occupational therapy studies of parent training and coaching (Baldwin et al., 2013; Foster et al., 2013; Graham & Rodger, 2010; Graham et al., 2009, 2010, 2013; King, 2009; Missiuna et al., 2012) and no studies that specifically examined teacher training or coaching. One older article reported benefits from a collaborative consultation model between occupational therapists and teachers for children with SP–SI difficulties, but this intervention was not described or reported specifically as coaching (Kemmis & Dunn, 1996). Thus, there is a large gap in the literature regarding occupational therapy practitioners' ability to help teachers teach students with disabilities more effectively. Although teacher consultation and collaboration is clearly part of the role of occupational therapy practitioners in the school system, and likely happens

frequently, the literature does not yet document their ability to perform in this role.

Although parents of children with challenges in SP–SI but without ASD also report a need for parent training and coaching and a desire to learn to better understand their child (Cohn, 2001a, 2001b; Cohn et al., 2000), efficacy research with this population is currently lacking and is an important area for future research. Future studies of children with challenges in SI–SP who are receiving occupational therapy services must consider parent education as an intervention and further examine parent coaching models.

One possible mechanism for change in the use of parent training and coaching is the influence of parent–professional interaction on parental self-efficacy. Therefore, measures of parent outcomes that could document parental changes in competence and self-efficacy after occupational therapy intervention would be an important contribution to occupational therapy's knowledge base. Models of child improvements suggest that altering parental self-efficacy and competence is one method of improving child outcomes (Trivette, Dunst, & Hamby, 2010). Another possible mechanism of change is the impact of reframing perceptions of behavior in a new light (Bulkeley, Bundy, Roberts, & Einfeld, 2016; Bundy, 1991; Cohn, 2001b). Parents have reported that this is an important outcome of occupational therapy intervention, and further research on the impact of this parental change on child outcomes would be illuminating.

Research on interventions for parents of children with challenges in SP–SI must include a thorough assessment of the child's sensory functions before initiation of treatment. SI theory is not meant to be used in a trial-and-error fashion, attempting a variety of treatment strategies without first clearly understanding the problem. Interventions should be specifically linked to the child's problem via clinical reasoning using SI theory and should be explained as such. Researchers studying SI interventions should be well versed in SI theory and be clear regarding the use of theory in the delivery of parent training or coaching.

Although the literature has reported that teachers value collaboration with occupational therapists (Barnes & Turner, 2001; Benson, Szucs, & Mejasic, 2016) and that teachers perceive that student improvements occur from collaboration, the field of occupational therapy has little information to guide practitioners in determining teacher training needs (Fairbairn & Davidson, 1993), nor does it have specific information to guide the development of training programs using characteristics of training that teachers would prefer and benefit from. Much of the research on teacher training methods falls within the examination of teachers' use of inclusion and their training

in inclusive practices (Waitoller & Artiles, 2013) and on the efficacy of specific methods of professional development (McConnell, Parker, Eberhardt, Koehler, & Lundeborg, 2013). Teacher training frequently consists of brief, one-time presentations, which are not successful at changing teacher practices long term. Research examining other models of teacher training will be important.

Finally, for training and coaching to be maximally effective, gains need to be maintained and carried forward over time. Longitudinal research is desperately needed to document the potential changes in child development trajectories for children of parents and teachers who receive effective training and coaching early in the child's life (Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Hamre & Pianta, 2001).

Implications for Occupational Therapy Practice

Limited recommendations can be made for practice from a review of just 4 articles. However, given the large body of literature on parent training and coaching in other fields for client populations other than children with SP-SI challenges, it is likely that parent training and coaching will be found to be an effective method for improving at least some specific child and parent outcomes for this population. Parents may be able to be trained relatively quickly to provide certain interventions with fidelity, and it appears that the best outcomes may be found for interventions that parents provide frequently, 1 or more times per day.

Practitioners should be encouraged to increase involvement with parents and to also increase parental engagement in therapy provided in the clinic and school system. Parent training is a provided service under the Individuals With Disabilities Education Act of 1990 (Pub. L. 101-476) and one for which occupational therapy is well suited. Occupational therapy practitioners are just beginning to report methods of systematically providing educational programming to parents of children with challenges in SP-SI (Jackson, 2014), but programs of this type have not yet been rigorously studied for their efficacy, nor have many such programs been reported in the literature to date. This is an important area for growth in occupational therapy.

Limitations

Multiple important limitations of this review must be addressed. First, clearly, the small number of articles that met the inclusion criteria limits the scope and the trust-

worthiness of the findings. The included articles vary tremendously in purpose, intervention type and length, and outcome measures, which limits the consistency of the findings. The articles' varied outcome measures made it difficult to compare results. No measure was used in more than 1 of the articles. Second, an unfortunate consequence of the methods of many of the studies was a heavy reliance on parent report, which could be biased because the parents knew they were participating in an intervention and would likely want to report that the intervention was helpful. Third, as is common in many studies of parents, the primary parent included was the mother, so even less is known about how fathers' involvement might affect outcomes. Fourth, of importance to occupational therapy practitioners is the minimal participation of practitioners in these studies. Occupational therapists were directly involved in the training or the interventions in only 2 of the 4 articles included (Dunn et al., 2012; Silva et al., 2011).

Conclusion

This review has five primary implications, but much of what may be said concerns the need for further research. First, parent training and coaching interventions appear to be effective for certain specific child and parent outcomes, at least for parents of children with ASD (who also have challenges in SP-SI). Second, research in occupational therapy that focuses on the population of children with SP-SI concerns must better quantify those difficulties using valid and reliable tools. Third, the occupational therapy research base is too narrow and must expand to include studies of parents of children with challenges in SP-SI but without comorbid ASD as well as studies of teacher education. Fourth, effective interventions reported in the literature from parents of children with ASD, ADHD, and other behavioral concerns can be used to help occupational therapy practitioners develop effective parent education programs for parents of children with challenges in SP-SI. Finally, the limited literature about the specific characteristics or process of parent training hinders conclusions regarding how or why these interventions might be effective. Future research to address all of these gaps is critical. ▲

Acknowledgments

We thank Marian Arbesman for contributing the detailed content included in the description of methods used in this study. The results of this study were presented at the 2016 AOTA Annual Conference & Expo, Chicago, IL.

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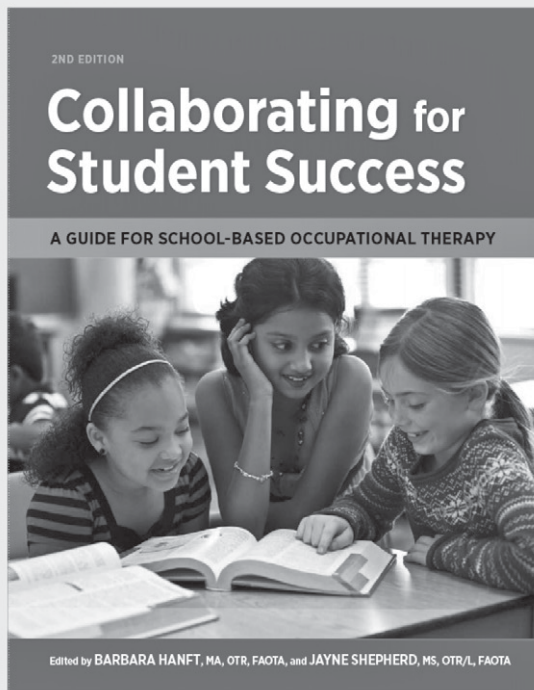
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