Published in final edited form as:
Am J Occup Ther. 2011 ; 65(3): 351–359.

Review of Occupational Therapy Research in the Practice Area of Children and Youth

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Abstract

A systematic review was conducted focusing on articles in the Occupational Therapy (OT) practice category of Childhood and Youth (C&Y) published in the *American Journal of Occupational Therapy* (AJOT) over the two-year period of 2009–2010. The frameworks of the International Classification of Functioning, Disability and Health (ICF) and Positive Youth Development (PYD) were used to explore OT research progress toward the goals of the Centennial Vision (CV). Forty-six research articles were organized by research type and were classified within these two frameworks. The majority of reviewed published research investigated variables representing constructs falling within the ICF domains of Body Functioning and Activity. The effect of OT interventions on PYD resided primarily in building competence. In order to meet the tenets of the CV, OTs must document changes in children's engagement in everyday life situations and build the evidence of OT's efficacy in facilitating participation.

Keywords

occupational therapy; pediatrics; youth; development

2007 Centennial Vision

Research articles published in 2009–2010 in the *American Journal of Occupational Therapy* (AJOT) in the practice area of *Childhood and Youth* (C&Y) were examined to assess categories of research, and the extent to which the published research generated evidence sufficient to support practice in accordance with the Centennial Vision (CV). One of the central tenants of the CV is to position occupational therapy (OT) as an evidence-based and sciencedriven profession (AOTA, 2007). Within the Vision, broad areas of practice and research are defined and include addressing the developmental needs of children and youth, as well as meeting their societal needs for health and well-being. In late 2006, the **Children & Youth Ad Hoc Committee** provided recommendations for research, education and practice in order to support the profession in meeting the tenants of the CV. The Committee raised key research questions and presented recommendations related to children and youth that focused on informing practice through reliable and patient/payer valued outcomes. Proposed research requirements included efficacy studies that examine OT interventions that support participation and lead to success in children's and adolescent's occupational roles. In an effort to meet these recommendations, OT research must be based on sound evaluation data. Moreover, OT outcomes in the area of practice should include: (a) participation of children and youth in life activities across a variety of environments, (b) prevention of social isolation, (c) support of children's development of roles and sense of competence, and (d) critical analysis of transition periods. Hence, a successful outcome for children and youth is

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the ability to participate as active members of the community with a sense of inclusion and competence.

Within the medical model, outcome measures in pediatric populations have traditionally focused on physiological and functional measures that are affected by the disease or disability. These outcomes provide important information about specific mechanisms underlying motor or functional ability yet may not accurately identify how the disability impacts a child's life or provide important information about real world abilities. Pediatric OT is grounded in the belief that children are complex individuals whose development is shaped by the dynamic process of interaction of the child with the physical, psychological, social and cultural environment. It is important, therefore, to go beyond medical and clinical assessments and focus on how children and their families experience illness and how they incorporate living with a disability into their lifestyles. Utilizing a healthcare model that addresses the multifaceted consequences of disease or impairment in children is quintessentially OT. Therefore, it is important for occupational therapy to align with a healthcare model such as that expressed by the World Health Organization's (WHO) International Classification of Functioning, Disability and Health (ICF) (WHO, 2001).

Alignment of the ICF with the OT Practice Framework

In all areas of healthcare, theoretical models and frameworks are important for clinical practice, research and education. The OT Practice Framework's emphasis on holistic intervention and management of symptoms related to underlying health conditions is consistent with the WHO's ICF model (2001). In the ICF-Children & Youth Version (ICF-CY) (WHO, 2007), exploring and treating the pathophysiology is only one of many actions aimed at improving and enhancing the participation of children with disabilities. This biopsychosocial model of health emphasizes that the needs of persons with disabilities are not just at the level of the individual or medical in nature, but are more broadly social, educational and functional in nature. The ICF has broad applications to a variety of areas in medicine and rehabilitation, and provides the basis for understanding the interrelationships between the person, the environment, health and participation. The ICF can also serve a very valuable function as the standard of reference for defining measurement and treatment domains. As we focus on meeting the agenda of the CV, engendering alignment of the OT Practice Framework with the ICF would assure that OT language is understandable by society's broader contexts including public policy, reimbursement and research arenas. In adhering to recommendations for achieving the CV put forth by the Children and Youth Ad Hoc Committee (2006) and focusing on development and participation in the range of meaningful contexts and environments (ICF-CY), OT can position itself to actively and systematically contribute to society's broad need for positive youth development.

Positive Youth Development

A goal of the CV is to ensure that OT practice and intervention enables individuals to overcome obstacles (physical, mental, environmental) that may prevent participation in valued life activities throughout the life span. The focus of OT in working with children is ultimately to ensure their well-being and success as healthy, developing individuals through amelioration of specific behaviors and deficiencies that may rob them of this role. Positive youth development (PYD) encompasses the facilitation of the skills, competencies and traits integral to the development of healthy, socially-minded, productive adults (Catalano, Berglund, Ryan, Lonczak & Hawkins, 1998). Positive youth development is a term often used by psychologists and social scientists, but also belongs in the language of OT. In examining OT's impact on the developmental trajectories of the children served, it is

prudent to examine the extent to which the profession is meeting societal need for the promotion of PYD.

A child's ability to meet developmental tasks, challenges and milestones provides a foundation for PYD. Catalano and colleagues (1998) evaluated programs for the promotion of PYD. They created a set of constructs that defined PYD allowing this concept to be measurable. Their report focused on numerous methodological problems that plague the field, many of which also plague OT. These include lack of follow-up measurements, lack of uniformity in the way findings are reported, and the narrow scope of outcome measures in most studies.

Participation, defined by the WHO ICF-CY as societal involvement in everyday activities and real-world life situations (2007), can promote PYD. In exploring the path to the CV and analyzing current research in C&Y published in AJOT, we asked: (a) To what extent does the research reflect Participation; both the construct of and the changes in Participation attributed to OT; and (b) is the current published intervention research in C&Y reflecting OT's capacity to meet society's occupational needs? Because of this, we chose to utilize the ICF and PYD models to frame our systematic review of 2009–2010 AJOT articles on childhood and youth.

Methods

Analysis

Forty-six research articles accepted for AJOT publication in 2009 and 2010 were systematically reviewed for this manuscript. Articles were initially screened by the editor of AJOT and identified as falling within the category of C&Y. All articles were read and discussed by the two authors then classified according to research type and evidentiary level based on AOTA's Levels of Evidence Rating System (Lieberman & Scheer, 2002). Categories of research type included: (a) instrument development and testing, (b) basic research that describes fundamental information about patient populations and factors impacting occupational performance, (c) efficacy studies that investigate aspects of OT interventions, and (d) effectiveness studies that test or review the effect of specific interventions used by OTs.

Studies were further summarized as to their contribution to the evidence-base relative to the five factors that dynamically and bi-directionally determine health, development and disability modeled in the ICF-CY. These factors included: (a) Body Function and Structure, (b) Activity, (c) Participation, (d) Environmental Factors, and (e) Personal Factors (WHO, 2007) which closely parallel the domains of occupational performance outlined in the OT Practice Framework (AOTA, 2008). Each author independently classified study variables, which included interventions, treatment outcomes and measures tested in instrument development studies. Classifications were then compared for inter-rater reliability and discrepancies were discussed to determine final classification.

Finally, of the 15 articles establishing evidence for the effectiveness of OT intervention, outcomes from the nine single effectiveness studies were analyzed with respect to the intervention's contribution to the PYD of the clients served. Categories used in this analysis included the facilitation of (a) **competence:** social, emotional, cognitive, behavioral, motor, sensory, scholastic and activity performance; (b) **connectedness:** bonding and school or community engagement; and (c) **confidence**: self-determination, self-efficacy and positive identity. Categories used were guided by operational categories of PYD programs established by Catalano et al. (1998).

Results

Of the forty-six articles included in this review, 12 (26.1%) reported on instrument development and testing, 15 (32.6%) were categorized as basic research, four (8.7%) were classified as efficacy studies, and 15 (32.6%) involved establishing evidence for the effectiveness of OT intervention. Of the 15 effectiveness studies, nine were single effectiveness studies and six detailed five systematic reviews.

Instrument Development and Testing

Twelve of the 46 C&Y studies published in AJOT in 2009–2010 contributed to the psychometric evidence for existing instruments or reported on the development of new measurement tools. Three articles reported on instruments with items classified to measure constructs of Body Functioning, which included tests of visual motor integration and visual perception (Brown, Unsworth & Lyons, 2009; Gere, Capps, Mitchell & Grubbs, 2009; Tsai, Lin, Liao & Hsieh, 2009). Two articles reported on instruments with items classified to measure constructs that fall within the ICF domain of Activity. Duff and Goyen (2010) reported on an instrument designed to measure handwriting performance. Josman, Goffer and Rosenblum (2010) reported on the development of an instrument that measured the child's activity performance in prescribed functional tasks performed in ecologically valid environments (e.g. making of a sandwich while in a kitchen). This measurement was judged to remain at the level of Activity because activities measured remain prescribed as opposed to occurring within the context of everyday situations.

The final seven psychometric articles reported on instruments measuring constructs within the ICF domain of Participation. Three assessed motor-based skills during engagement in the school setting (Chien, Brown & McDonald, 2010; Kuijper, van der Wilden, Ketelaar & Gorter, 2010; Munkholm, Berg, Lofgren & Fisher, 2010). The remaining measured Participation of school functioning, leisure activity, overall occupational performance and quality of life (Hwang & Davies, 2009; Kramer, Kielhofner & Smith, 2010; Rosenblum, Sachs & Schreuer, 2010; Weintraub & Bar-Haim Erez, 2009). Kramer et al. contributed to the psychometric evidence of the Child Occupational Self Assessment (COSA), an instrument in which the child rates activities based on perceived personal competence and importance. As such, this instrument was judged to measure constructs that fall within the domains of Personal Factors as well as Participation.

Basic Research

Quantitative, qualitative and mixed method studies were represented in the 15 articles that comprised the basic research category. Of these, five described aspects of performance that differed for children with specific disabilities relative to their typically developing peers or a normative sample (Dickie, Baranek, Schultz, Watson & McComish, 2009; Engel-Yeger, Jarus, Anaby & Law, 2009; Galvin, Froude & Imms, 2009; Reynolds & Lane, 2009; Su, Wu, Yang, Chen-Sea & Hwang, 2010). Dickie et al., Gavin et al., Reynolds and Lane, and Su et al. each examined Body Function level variables in their respective populations. Additionally, Dickie et al. provided qualitative description of sensory experiences in everyday life situations (Participation). Reynolds and Lane discussed the impact of Personal Factors of confidence and concerns on the Body Functions of anxiety and sensory over-responsiveness in children with ADHD. Engel-Yeger et al. compared Participation patterns for children with and without CP; Participation was also analyzed with respect to the Personal Factor of gender.

Eight quantitative studies investigated the strength of relationships between salient variables for both typically developing children and groups with specific disabilities. Three of these

eight correlation studies investigated solely Body Function level variables (Bharadwaj, Daniel & Matzke, 2009; Gal, Dyck & Passmore, 2010; Rechetnikov & Maitra, 2009). In two additional correlation studies, the relationship of Body Function variables to Environmental Factors (Brown & Dunn, 2010) and Participation (Cosby, Johnson & Dunn, 2010) was described. Activity level variables were investigated in two of the eight correlation studies; one described relationships to Environment (Cote, 2009) and the other (Engel-Yeger, Nagauker-Yanuv, & Rosenbaum, 2009) to both Activity and Personal level variables. The final correlation study investigated the relationship of Personal Factors impacting occupational performance (Engel-Yeger, 2009).

The final two basic research articles provided description of factors impacting occupational performance. Eglison and Traustadottir (2009) used mixed research methods to describe how Activity, Environmental Factors and Personal Factors impact Participation for students with physical disabilities. Pierce, Munier and Myers (2009) informed development with a qualitative description of infant and toddler performance of Activity within the context of role Participation as influenced by the natural home Environment.

Efficacy Studies

Four articles reported on aspects of intervention that contribute to our evidence of treatment efficiency. These studies reported on patient perceptions related to OT interventions, the identification of strategies OT's use to teach caregivers, and observations of real-life implementation of best practices advocated by OT. The two studies reporting patient perceptions (Hemmingsson et al., 2009; Sachs & Nesser, 2009) were classified as reporting on Personal Factors. The two remaining studies (Colyvas, Sawyer & Campbell, 2010; Yonkman, O'Neil, Talty & Bull, 2010) were classified as reporting on Environmental Factors.

Effectiveness Studies

Level I Evidence—In the literature reviewed, the strongest evidence for OT treatment effectiveness included one single effectiveness study and six articles involving five systematic reviews investigating OT for children and adolescents with difficulty processing and integrating sensory information.

Silva, Schalock, Ayres, Bunse and Budden (2009) reported on a randomized, controlled trial using a complementary and alternative therapy, Qigong massage, to decrease multi-system impairments in children with autism. This individual level intervention incorporated the family as primary providers of the treatment. Outcomes were within Body Function and Participation domains. Participation was measured by improvement in social and communication skills and reduction in maladaptive behaviors in home and school situations. Lane and Schaaf (2010), in a systematic review of the neuroscience evidence for sensory-driven neuroplasticity, found Body Function level evidence supporting the postulates of Ayres' sensory integration (SI) theory. In Davies and Tucker's (2010) systematic review of the evidence supporting the existence of subtypes of children with difficulty processing and integrating sensory information, minimal direct evidence was found. Instead, researchers found themes indicating the importance of comprehensive Body Function assessment of sensory-based functions such as sensory modulation and praxis. In May-Benson and Koomar's (2010) systematic review examining the evidence for efficacy of treatments utilizing a SI approach for children and adolescents with difficulty processing and integrating sensory information, they concluded that the SI treatment approach may lead to positive results in Body Function, Activity and Participation level outcomes. Polatajko and Cantin (2010) concluded that there is evidence of potential benefit from interventions other than SI, as measured by outcomes primarily within the domain of Activity. Koenig and

Rudney (2010) found empirical evidence of performance difficulties at both Activity and Participation levels for children and adolescents with difficulty processing and integrating sensory information.

Level II Evidence—Three OT treatment effectiveness studies met criteria for Level II evidence (Hwang, Lin, Coster, Bigsby & Vergara, 2010; Watson, Ito, Smith & Andersen, 2010; Wuang, Wang, Huang & Su, 2009). Hwang et al. utilized a cross-over design in which infants served as their own control to examine the effect of jaw and cheek oral support (Body Function) during bottle feeds for twenty preterm infants in the NICU. This study measured both feeding Activity performance and physiological state (Body Function) pre and during the feeds. Wuang et al. investigated comparative treatment effects of SI, neurodevelopmental treatment, and perceptual motor interventions with children with mild intellectual disability. This investigation used a pre-post design and three treatment groups with an equal size control group to investigate SI, motor and visual motor effects of treatment. Both Huang et al. and Wuang et al. investigated person-level interventions (direct intervention on the child) of Body Function level variables for the improvement of Activity level outcomes. Watson et al. used a repeated measures pre-post design with 13 preschool through eighth grade special education students who served as their own controls. Researchers examined the effect of assistive technology provision on school performance. This Environmental Factor intervention augmented Activity for the improvement of Participation level outcomes.

Level III Evidence—Two studies met criteria for Level III evidence in their use of single group pre-post research designs (Bazyk, Michaud, Goodman, Papp, Hawkins & Welch, 2009; Mackay, McCluskey & Mayes, 2010). Bazyk et al. investigated the effect of OT services, which had been integrated into a kindergarten curriculum, on fine motor and emergent literacy outcomes for 37 children with and without disability. Mackay et al. measured the effect of a handwriting-training program delivered to thirty-two 6 – 8 year olds identified with difficult-to-read handwriting; aspects of handwriting performance measured included legibility and size. The handwriting intervention study reported by Mackay et al. examined an Activity level intervention on Activity level outcome variables. Byzek et al. examined the effect of an Environmental Factor intervention, classroom integrated OT, on Activity level outcomes of fine motor and emergent literacy skills.

Level IV Evidence—Three studies met criteria for Level IV evidence of treatment effectiveness in their use of behavioral measurement at various time points for groups of single subjects or a single case (Bagatell, Mirigliani, Patterson, Reyes & Test, 2010; Costigan & Light, 2010; Roberts, Siever & Mair, 2010). Roberts et al. measured handwriting performance (Activity) and attitude and personal satisfaction (Personal Factor) with handwriting at four time points in 42 fourth, fifth and sixth graders. Outcomes were associated with the provision of a kinesthetic writing intervention classified as an Activity level intervention. Bagatell et al. studied the effect of therapy ball chair use (Activity) combined with modeling of ball use and behavior (Environmental Factor) on classroom Participation. Study researchers also described the Personal Factor of each of the six children’s seating preferences. Costigan and Light studied the effect of proper-seated position (Body Function) to access an augmentative communication device (Activity) for a student with CP.

Conclusion

OT research and the ICF

The bulk of reviewed published research in C&Y measured and investigated variables representing constructs that fall within the ICF domains of Body Functioning and Activity (Figure 1). The majority of the single-test interventions reported in AJOT during 2009–2010 focused on Activity-based outcomes such as visual-motor integration, motor skill, feeding and handwriting. As a whole, most treatment effectiveness studies measured clinical and activityC& Y Centennial Vision 14 based outcomes of the intervention. While study outcome measurements were at times assessed in the child's real world contextual environments, such as at home or school, only two studies (Bagatell et al., 2010;Watson et al., 2010) directly measured treatment effect on engagement in every-day life situations. Many research studies left the reader to presume that changes observed in body function and activity skills translate to involvement in everyday activities and real-world life situations.

While the majority of the variables investigated in the basic research studies were classified as Body Function level variables, the scope of variables investigated did span the breadth of the five factors identified in the ICF framework. For basic research, there exists a relatively even distribution amongst the remaining four factors of Activity, Participation, Environment and Personal.

Greater than half of the instrument development and testing studies were judged to measure constructs that fall within the domain of Participation. The higher levels of testing and development of Participation level measures implies facilitation of the much-needed measurement of occupational performance in real-world life situations.

OT intervention and PYD

Not surprisingly, the impact of OT interventions on PYD resides primarily in our ability to effectively build competence (Table 2). With regard to the single effectiveness studies, eight of fourteen reported treatment outcomes had relevance to the development of competence at the Activity and Participation level, with an additional four outcomes having relevance to the development of competence at the Body Function level. Additionally, one intervention demonstrated treatment effect for the development of self-efficacy, an integral aspect of the development of personal confidence. No OT interventions reported measurement of the treatment's impact on emotional competence, connectedness, self-determination or the development of a positive self-identity.

Discussion

The breadth of the conceptually challenging contextual aspects of childhood participation remains to be fully explicated. Participation is not as simple as an adolescent or child making choices to engage in activities because the activities matter to him or her. The reality remains that children, as well as adults, with disability often engage in participatory choices made or at least constrained by several factors that include all aspects of the physical, social and attitudinal world (Forsyth & Jarvis, 2002; WHO, 2007). Childhood participation is, in many situations, occupational performance of childhood. For children and youth with chronic impairment, limitations in physical and or social activity often result in restrictions to overall participation in these everyday activities. Children with chronic impairment and disability are at risk of lower participation in activities of everyday life (King et al, 2004). From a social perspective, the child's actual engagement in everyday life situations represents childhood functioning (WHO, 2007). For children, *life situations* change dramatically over time, from intimate interactions with parents as a young child to the development of close relationships with siblings and peers in their own proximal

environment. Regardless of the child's stage, the various contexts of childhood participation have social interaction as a common thread.

Strict adherence to the WHO's definition of Participation was used in this analysis and can be viewed as a limitation of this study. It was with this construction of Participation that variables initially analyzed as Activity versus Participation were critically assessed for the inherent level of the variable's social interaction as described in the respective articles. Variables with stronger threads of inherent social interaction were classified as Participation. Studies whose variables were classified as Activity but included measurement in varied or contextual environments were included as Environmental level variables whenever the study researchers treated the context as such.

OT is poised to be a science-based profession effective in meeting the needs of society, but we must make concerted efforts to document and empirically measure the real-life, every-day changes in occupational performance that come from changes in body-function and activity-based clinical measures classically used in OT, such as visual-motor integration, motor skill, feeding and handwriting. OT's must document changes in children's engagement in everyday life situations and build the evidence of OT's efficacy in facilitating participation. Our clients tell us why they return to treatment session after session. It's not because Johnny can now tolerate up to six textures in one meal. But rather how the increase in texture tolerance is reducing mealtime anxiety and enabling the family to sit and eat an entire meal without meltdown; which in turn enables Johnny and his siblings to benefit from both the nutritional and psycho-affective benefits of a family meal.

When interventions are effective, the impact is not only on the child's development, activity performance, and participation, but also the on the child's well-being and overall life-trajectory. OT intervention has the potential to influence positive youth development. OT's must continue to push beyond the development of competence and activity performance toward participation. Participation in everyday-life pursuits provides a universal framework on which to express one-self, develop skills, affiliations and friendships. Participation serves as the milieu in which youth establish a sense of belonging and life meaning (Tinsley & Eldredge, 1995); attributes essential to PYD. The fundamental tenants of this profession provide a guide to facilitate the competencies, attitudes, practices and social skills necessary for successful occupational performance within each individual's social context and life stage. In fully addressing the multiple facets outlined in the Practice Framework, OT intervention can answer the call of society's need as active agents of PYD.

References

Arbesman M, Lieberman D. Methodology for the systematic reviews on occupational therapy for children and adolescents with difficulty processing and integrating sensory information. American Journal of Occupational Therapy. 2010; 64:368–374. [PubMed: 20608269]

American Occupational Therapy Association. Children and Youth Ad Hoc Committee - Recommendations for education and practice. 2006. Retrieved from American Occupational Therapy Association website: http://www.aota.org/News/Centennial/AdHoc/2006.aspx

American Occupational Therapy Association. AOTA's Centennial Vision and executive summary. American Journal of Occupational Therapy. 2007; 61:613–614.

American Occupational Therapy Association. Occupational therapy practice framework: Domain and process. American Journal of Occupational Therapy (2nd ed.). 2008; 62:625–683. [PubMed: 19024744]

Bagatell N, Mirigliani G, Patterson C, Reyes Y, Test L. The Effectiveness of therapy ball chairs on classroom participation in children with autism spectrum disorders. American Journal of Occupational Therapy. 2010 Nov/Dec.64 (2010).

Bazyk S, Michaud P, Goodman G, Papp P, Hawkins E, Welch MA. Integrating occupational therapy services in a kindergarten curriculum: A look at the outcomes. American Journal of Occupational Therapy. 2009; 63:160–171. [PubMed: 19432054]

Bharadwaj SV, Daniel LL, Matzke PL. Brief Report—Sensory processing disorder in children with cochlear implants. American Journal of Occupational Therapy. 2009; 63:208–213. [PubMed: 19432059]

Brown NB, Dunn W. Relationship between context and sensory processing in children with autism. Journal of Occupational Therapy. 2010; 64:474–483.

Brown T, Unsworth C, Lyons C. The factor structure of four visual-motor instruments commonly used to evaluate school-aged children. American Journal of Occupational Therapy. 2009; 63:710–723. [PubMed: 20092107]

Catalano, RF.; Berglund, ML.; Ryan, JAM.; Lonczak, HS.; Hawkins, JD. Positive youth development in the United States: Research findings on evaluations of positive youth development programs. 1998. Retrieved from Office of the Assistant Secretary for Planning and Evaluation website: http://aspe.hhs.gov/hsp/positiveyouthdev99/

Chien CW, Brown T, McDonald R. Examining content validity and reliability of the Assessment of Children's Hand Skills (ACHS): A preliminary study. American Journal of Occupational Therapy. 2010 Sept/Oct.64 (2010).

Colyvas JL, Sawyer BL, Campbell PH. Identifying strategies early intervention occupational therapists use to teach caregivers. American Journal of Occupational Therapy. 2010 Sept/Oct.64 (2010).

Cosbey J, Johnston SS, Dunn ML. Sensory processing disorders and social participation. American Journal of Occupational Therapy. 2010; 64:462–473. [PubMed: 20608277]

Costigan FA, Light J. The effect of seated position on upper extremity access to augmentative communication for children with cerebral palsy: Preliminary investigation. American Journal of Occupational Therapy. 2010 July/Aug.64 (2010).

Coté CA. The influence of a misleading context on a design copying task with learning-disabled and non-disabled children. American Journal of Occupational Therapy. 2009; 63:481–489. [PubMed: 19708477]

Davies PL, Tucker R. Evidence review to investigate the support for subtypes of children with difficulty processing and integrating sensory information. American Journal of Occupational Therapy. 2010; 64:391–402. [PubMed: 20608271]

Dickie VA, Baranek GT, Schultz B, Watson LR, McComish CS. Parent reports of sensory experiences of preschool children with and without autism: A qualitative study. American Journal of Occupational Therapy. 2009; 63:172–181. [PubMed: 19432055]

Duff S, Goyen TA. Reliability and validity of the Evaluation Tool of Children's Handwriting-Cursive (ETCH-C) using the General Scoring Criteria. American Journal of Occupational Therapy. 2010; 64:37–46. [PubMed: 20131563]

Egilson ST, Traustadottir R. Participation of students with physical disabilities in the school environment. American Journal of Occupational Therapy. 2009; 63:264–272. [PubMed: 19522135]

Engel-Yeger B. Sociodemographic effects on activities preferences of typically developing Israeli children and youths. American Journal of Occupational Therapy. 2009; 63:89–95. [PubMed: 19192731]

Engel-Yeger B, Jarus T, Anaby D, Law M. Differences in patterns of participation between youths with cerebral palsy and typically developing peers. American Journal of Occupational Therapy. 2009; 63:96–104. [PubMed: 19192732]

Engel-Yeger B, Nagauker-Yanuv L, Rosenblum S. Handwriting performance, self-reports, and perceived self-efficacy among children with dysgraphia. American Journal of Occupational Therapy. 2009; 63:182–192. [PubMed: 19432056]

Forsyth R, Jarvis S. Participation in childhood. Child: Care, Health & Development. 2002; 28:277–279.

Gal E, Dyck MJ, Passmore A. Relationships between stereotyped movements and sensory processing disorders in children with and without developmental or sensory disorders. American Journal of Occupational Therapy. 2010; 64:453–461. [PubMed: 20608276]

Galvin J, Froude EH, Imms C. Sensory processing abilities of children who have sustained traumatic brain injuries. American Journal of Occupational Therapy. 2009; 63:701–709. [PubMed: 20092106]

Gere DR, Capps SC, Mitchell DW, Grubbs E. Sensory sensitivities of gifted children. American Journal of Occupational Therapy. 2009; 63:288–295. [PubMed: 19522137]

Hemmingsson H, Lidstrom H, Nygard L. Use of assistive technology devices in mainstream schools: Students' perspectives. American Journal of Occupational Therapy. 2009; 63:463–472. [PubMed: 19708475]

Hwang JL, Davies PL. Brief Report—Rasch analysis of the school function assessment provides additional evidence for the internal validity of the activity performance scales. American Journal of Occupational Therapy. 2009; 63:369–373. [PubMed: 19522146]

Hwang YS, Lin CH, Coster WJ, Bigsby R, Vergara E. Effectiveness of cheek and jaw support to improve feeding performance of preterm infants. American Journal of Occupational Therapy. 2010 Nov/Dec.64 (2010).

Josman N, Goffer A, Rosenblum S. The Development and standardization of a 'Do-Eat' activity of daily living performance test for children. American Journal of Occupational Therapy. 2010; 64:47–58. [PubMed: 20131564]

King, G.; Law, M.; King, S.; Hurley, P.; Rosenbaum, P.; Hanna, S.; Kertoy, M.; Young, N. Children's assessment of participation and enjoyment & preferences for activities of children manual. San Antonio, TX: Harcourt Assessment, Inc.; 2004.

Koenig KP, Rudney SG. Performance difficulties for children and adolescents with difficulties processing and integrating sensory information: A systematic review. American Journal of Occupational Therapy. 2010; 64:430–442. [PubMed: 20608274]

Kramer JM, Kielhofner G, Smith EV Jr. Validity evidence for the Child Occupational Self Assessment (COSA). American Journal of Occupational Therapy. 2010 July Aug.64 (2010).

Kuijper MA, van der Wilden GJ, Ketelaar M, Gorter JW. The Manual Ability Classification System for children with cerebral palsy in a school setting and its relationship to home self-care activities. American Journal of Occupational Therapy. 2010 July/Aug.64 (2010).

Lane SJ, Schaaf RC. Examining the neuroscience evidence for sensory driven neuroplasticity: Implications for sensory-based occupational therapy for children and adolescents. American Journal of Occupational Therapy. 2010; 64:375–390. [PubMed: 20608270]

Lieberman D, Scheer J. AOTA's evidence-based literature review project: An overview. American Journal of Occupational Therapy. 2002; 56:344–349. [PubMed: 12058525]

Mackay N, McCluskey A, Mayes R. The Log Handwriting Program improved children's writing legibility: A pre-post test study. American Journal of Occupational Therapy. 2010; 64:30–36. [PubMed: 20131562]

May-Benson TA, Koomar JA. Systematic review of the research evidence examining the efficacy of interventions using a sensory integrative approach for children. American Journal of Occupational Therapy. 2010; 64:403–414. [PubMed: 20608272]

Munkholm M, Berg B, Lofgren B, Fisher AG. Cross-regional validation of the School Version of the Assessment of Motor and Process Skills. American Journal of Occupational Therapy. 2010 Sept/Oct.64 (2010).

Pierce D, Munier V, Myers C. Informing early intervention through an occupational science description of infant-toddler interactions with home space. American Journal of Occupational Therapy. 2009; 63:273–287. [PubMed: 19522136]

Polatajko HJ, Cantin N. Exploring the effectiveness of occupational therapy interventions, other than the sensory integration approach, with children and adolescents experiencing difficulties processing and integrating sensory information. American Journal of Occupational Therapy. 2010; 64:415–429. [PubMed: 20608273]

Rechetnikov RP, Maitra KK. Motor impairments in children associated with impairments of speech or language: A meta-analytic review of research literature. American Journal of Occupational Therapy. 2009; 63:255–263. [PubMed: 19522134]

Reynolds S, Lane S. Sensory over-responsivity and anxiety in children with ADHD. American Journal of Occupational Therapy. 2009; 63:433–440. [PubMed: 19708472]

Roberts G, Siever JE, Mair JB. Effects of a kinesthetic cursive handwriting intervention for grade 4 to 6 students. American Journal of Occupational Therapy. 2010 Sept/Oct.64 (2010).

Rosenblum S, Sachs D, Schreuer N. Reliability and validity of the Children's Leisure Assessment Scale (CLASS). American Journal of Occupational Therapy. 2010 July /Aug.64 (2010).

Sachs D, Nasser K. Facilitating family occupations: Family member perception of a specialized environment for children with mental retardation. American Journal of Occupational Therapy. 2009; 63:453–462. [PubMed: 19708474]

Silva LMT, Schalock M, Ayres R, Bunse C, Budden S. Qigong massage treatment for sensory and self-regulation problems in young children with autism: A randomized controlled trial. American Journal of Occupational Therapy. 2009; 63:423–432. [PubMed: 19708471]

Su CT, Wu MY, Yang AL, Chen-Sea MJ, Hwang IS. Impairment of stance control in children with sensory modulation disorder. American Journal of Occupational Therapy. 2010; 64:443–452. [PubMed: 20608275]

Tinsley HEA, Eldredge BD. Psychological benefits of leisure participation: a taxonomy of leisure activities based on their need-gratifying properties. Journal of Counseling Psychology. 1995; 42:123–132.

Tsai LT, Lin KC, Liao HF, Hsieh CL. Reliability of two visual-perceptual tests for children with cerebral palsy. American Journal of Occupational Therapy. 2009; 63:473–480. [PubMed: 19708476]

Watson AH, Ito M, Smith RO, Andersen L. The effect of assistive technology in a public school setting. American Journal of Occupational Therapy. 2010; 64:18–29. [PubMed: 20131561]

Weintraub N, Bar-Haim Erez AB. The Quality of Life in School (QoLS) Questionnaire: Development and validity. American Journal of Occupational Therapy. 2009; 63:724–731. [PubMed: 20092108]

World Health Organization. Geneva, Switzerland: WHO Press; 2001. International classification of functioning, disability and health.

World Health Organization. Geneva, Switzerland: WHO Press; 2007. International classification of functioning, disability and health: children & youth version.

Wuang YP, Wang CC, Huang MH, Su CY. A prospective study of the effect of sensory integration, neuro-developmental treatment, and perceptual motor therapy on the sensorimotor performance in children with mild mental retardation. American Journal of Occupational Therapy. 2009; 63:441–452. [PubMed: 19708473]

Yonkman J, O'Neil J, Talty J, Bull MJ. Brief Report. Transporting children in wheelchairs in passenger vehicles: A comparison of best practice to observed and reported practice in a pilot sample. American Journal of Occupational Therapy. 2010 Sept/Oct.64 (2010).

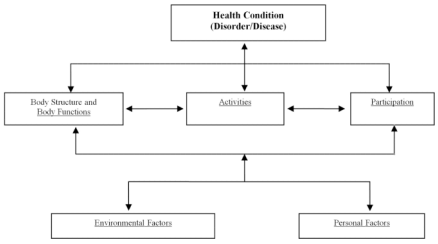

Figure 1.
World Health Organization's International Classification of Functioning, Disability and Health(2001)

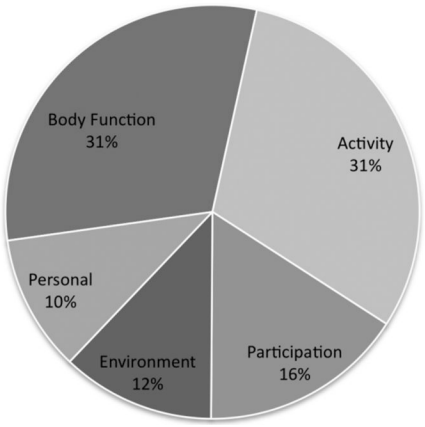

Figure 2.
International Classification of Functioning, Disability and Health classification of 2009–2012 American Journal of Occupational Therapy research articles published on childhood and youth (N = 46).

Table 1

Classification of research type and level of evidence for treatment effectiveness studies.

Reference **N = 46**	**Effectiveness Study / Level of Evidence**		**Efficacy Study**	**Basic Research**	**Instrument Development and Testing**
Arbesman & Lieberman (2010)	●	I			
Bagatell, Mirigliani, Patterson, Reyes & Test (2010)	●	IV			
Bazyk, Michaud, Goodman, Papp, Hawkins & Welch (2009)	●	III			
Bharadwaj, Daniel & Matzke (2009)				●	
Brown & Dunn (2010)				●	
Brown, Unsworth & Lyons (2009)					●
Chien, Brown & McDonald (2010)					●
Colyvas, Sawyer & Campbell (2010)			●		
Cosbey, Johnston & Dunn (2010)				●	
Costigan & Light (2010)	●	IV			
Coté (2009)				●	
Davies & Tucker (2010)	●	I			
Dickie, Baranek, Schultz, Watson & McComish (2009)				●	
Duff & Goyen (2010)					●
Egilson & Traustadottir (2009)				●	
Engel-Yeger (2009)				●	
Engel-Yeger, Jarus, Anaby & Law (2009)				●	
Engel-Yeger, Nagauker-Yanuv & Rosenblum (2009)				●	
Gal, Dyck & Passmore (2010)				●	
Galvin, Froude & Imms (2009)				●	
Gere, Capps, Mitchell & Grubbs (2009)					●
Hemmingsson, Lidstrom & Nygard (2009)			●		
Hwang & Davies (2009)					●
Hwang, Lin, Coster, Bigsby & Vergara (2010)	●	II			
Josman, Goffer & Rosenblum (2010)					●
Koenig, & Rudney (2010)	●	I			

Reference N = 46	Effectiveness Study / Level of Evidence		Efficacy Study	Basic Research	Instrument Development and Testing
Kramer, Kielhofner, & Smith (2010)					●
Kuijper, van der Wilden, Ketelaar & Gorter (2010)					●
Lane & Schaaf (2010)	●	I			
Mackay, McCluskey & Mayes (2010)	●	III			
May-Benson & Koomar (2010)	●	I			
Munkholm, Berg, Lofgren, Fisher (2010)					●
Pierce, Munier & Myers (2009)				●	
Polatajko & Cantin (2010)	●	I			
Rechetnikov & Maitra (2009)				●	
Reynolds & Lane (2009)				●	
Roberts, Siever & Mair (2010)	●	IV			
Rosenblum, Sachs & Schreuer (2010)					●
Sachs & Nasser (2009)			●		
Silva, Schalock, Ayres, Bunse & Budden (2009)	●	I			
Su, Wu, Yang, Chen-Sea & Hwang (2010)				●	
Tsai, Lin, Liao & Hsieh (2009)					●
Watson, Ito, Smith & Andersen (2010)	●	II			
Weintraub & Bar-Haim Erez (2009)					●
Wuang, Wang, Huang & Su (2009)	●	II			
Yonkman, O'Neil, Talty & Bull (2010)			●		

Table 2

Contributions to PYD of empirically tested OT interventions published in AJOT 2009 & 2010 on children and youth.

	Competence								Connectedness		Confidence		
	Social / Communication	**Emotional**	**Cognitive**	**Behavioral**	**Motor**	**Sensory**	**Scholastic**	**Activity Performance**	**Bonding**	**School / Community engagement**	**Self-determination**	**Self-efficacy / Personal-satisfaction**	**Positive identity**
Bagatell, Mirigliani, Patterson, Reyes, & Test (2010)				X									
Bazyk, Michaud, Goodman, Papp, Hawkins, & Welch (2009)			X		X								
Costingan & Light (2010)	X												
Hwang, Lin, Coster, Bigsby, & Vergara (2010)								X					
Mackay, McCluskey, & Mayes (2010)								X					
Roberts, Siever, & Mair (2010)								X				X	
Silva, Schalock, Ayres, Bunse, & Budden (2009)	X			X		X							
Watson, Ito, Smith, & Andersen (2010)							X						
Wuang, Wang,					X	X							

	Competence								Connectedness		Confidence		
	Social / Communication	**Emotional**	**Cognitive**	**Behavioral**	**Motor**	**Sensory**	**Scholastic**	**Activity Performance**	**Bonding**	**School / Community engagement**	**Self-determination**	**Self-efficacy / Personal-satisfaction**	**Positive identity**
Huang, & Su (2009)													