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Occupational Therapy in Neurological Disorders: Looking Ahead to the American Occupational Therapy Association's *Centennial Vision*

Ashwini K. Rao, EdD, OTR [Associate Professor]

Program in Physical Therapy, Department of Rehabilitation and Regenerative Medicine and G. H. Sergievsky Center, Columbia University, New York; akr7@columbia.edu

Abstract

The *Centennial Vision* articulated by the American Occupational Therapy Association includes moving the profession to being science driven and evidence based. The *American Journal of Occupational Therapy* contributes to this vision by publishing high-quality research. I reviewed research in the practice area of neurological rehabilitation published between May 2010 and October 2011. In particular, I reviewed effectiveness and efficacy studies, instrument development and testing, and basic research studies. Concerns emerging from the review were (1) few studies in neurological rehabilitation; (2) many disorders not represented; (3) exclusive use of impairment-level outcomes in some studies; and (4) high preponderance of case series designs in effectiveness studies. To achieve the *Centennial Vision*, the field needs to improve the volume and diversity of research in neurological rehabilitation. It is also important to modify academic and clinical practice to enable occupational therapists to spend more time in producing high-quality evidence to support the crucial role they play in neurological rehabilitation.

Keywords

diagnostic techniques, neurological; nervous system diseases; occupational therapy; research; treatment outcome

Domain of Occupational Therapy

Occupational therapists and occupational therapy assistants aim to improve health and participation of clients through engagement in occupation, which includes activities of daily living, instrumental activities of daily living, rest, education, work, play, leisure, and social participation (American Occupational Therapy Association [AOTA], 2008). Occupational therapists assess client factors (such as performance skills and performance patterns), activity demands, and environmental–contextual factors to understand underlying factors that support and hinder successful engagement in occupations.

On the basis of the assessment, occupational therapists decide on an intervention plan that has demonstrated effectiveness (which may include either preparatory skills or engagement in purposeful activity). It is imperative that practitioners have a clear rationale for the selection of valid, reliable, and accurate assessment tools and for choosing the most up-to-date intervention with demonstrated effectiveness.

Maintaining Knowledge and Skills

Updating occupational therapy practitioners' knowledge of assessments and effective interventions through continuing education and surveys of current literature is a collective

professional responsibility. AOTA, among others, provides numerous opportunities for clinicians to update their knowledge and hands-on skills through continuing education. The *American Journal of Occupational Therapy* (AJOT) has primary responsibility for presenting well-designed effectiveness studies in clinical practice areas in addition to systematic reviews of current literature.

American Occupational Therapy Association's Centennial Vision

AOTA began a strategic planning initiative in 2004 to optimize occupational therapists' role in promoting health. The strategic planning initiative resulted in the following shared vision statement for the Centennial in 2017: "We envision that occupational therapy is a powerful, widely recognized, science-driven, and evidence-based profession with a globally connected and diverse workforce meeting society's occupational needs" (AOTA, 2007, p. 613). Two elements of the vision statement, namely, helping occupational therapy develop into a science-driven and evidence-based profession, constitute an important function of AJOT.

American Journal of Occupational Therapy and the Centennial Vision

AJOT has articulated a clear vision to achieve AOTA's *Centennial Vision*. This vision was articulated by AJOT's editor and includes the following:

1. Improve the journal's access to a wider audience nationally and internationally by making AJOT an online publication (Gutman, 2010b).
2. Improve the journal's impact factor through timely publication of high-quality studies, particularly those that examine the effectiveness of occupational therapy intervention in specific practice areas (Gutman, 2010b).
3. Contribute to the development of occupational therapy as a science-driven and evidence-based profession by publishing larger numbers of high-quality intervention studies (Gutman, 2010a).
4. Improve the quality of published intervention studies by starting the Research Scholars Initiative, a special program in AJOT in which established and productive research groups in occupational therapy are invited to publish effectiveness or efficacy studies (Gutman, 2010c).

Each of these efforts has contributed to improving the journal's quality and impact factor.

Occupational Therapy Research in Neurological Disorders

For this review, I searched for articles related to neurological rehabilitation published in AJOT between May 2010 and October 2011. Of the 116 articles published in the journal during this time (including editorials), only 21 (18%) were related to neurological rehabilitation. Of the 21 articles, one was a *Centennial Vision* article (Wolf, 2011), which was not included in this review. The remaining 20 articles (shown in Table 1) included 8 effectiveness studies (40%; Hardy et al., 2010; Hayner, Gibson, & Giles, 2010; Henshaw, Polatajko, McEwen, Ryan, & Baum, 2011; Kim & Colantonio, 2010; Maitra et al., 2010; Nilsen, Gillen, & Gordon, 2010; Page, Murray, & Hermann, 2011; Wu, Radcliff, & Hanna-Pladdy, 2011), 2 efficacy studies (10%; Beckelhimer, Dalton, Richter, Hermann, & Page, 2011; McCall, McEwen, Colantonio, Streiner, & Dawson, 2011), 4 studies on instrument development and testing (20%; Classen, Witter, et al., 2011; Doig, Fleming, Kuipers, & Cornwell, 2010; Lehman, Sindhu, Johnson, & Velozo, 2011; Lehman, Woodbury, & Velozo, 2011), and 6 basic science studies (30%; Classen, Levy, et al., 2011; Goverover, Chiaravalloti, & DeLuca, 2010; Hwang, Cvitanovich, Doroski, & Vajarakitpongse, 2011;

Schmid et al., 2011; Wu, Hermann, Ying, & Page, 2010; Wu, Radel, & Hanna-Pladdy, 2011).

Effectiveness and Efficacy Studies

Practice Areas

According to a comprehensive study on the occurrence of neurological disorders (Hirtz et al., 2007), the most common adult disorders in the United States are stroke, traumatic brain injury (TBI), Alzheimer's disease, epilepsy, Parkinson's disease, spinal cord injury, multiple sclerosis, Huntington's disease, and amyotrophic lateral sclerosis. Given that occupational therapists work with people who have most of these disorders, one would expect to see publications in *AJOT* reflecting the diversity of practice areas. However, during the past year, among the effectiveness and efficacy research, 8 of 10 studies were related to stroke, 1 was related to multiple sclerosis, and 1 was related to TBI (Table 2). Disorders such as Parkinson's disease, spinal cord injury, Huntington's disease, and amyotrophic lateral sclerosis were not addressed. Alzheimer's disease is not represented in this review because it was addressed in a special issue of *AJOT* (Padilla, 2011).

Occupational therapists studying some of the disorders underrepresented in *AJOT* are likely to be publishing in journals outside the field. A Medline search revealed several articles on the effectiveness of occupational therapy in Parkinson's disease (70 articles), spinal cord injury (57 articles), Huntington's disease (14 articles), and amyotrophic lateral sclerosis (8 articles) published in journals outside occupational therapy. These articles indicate that occupational therapists are involved in conducting research in these practice areas, either as investigators or as individuals providing intervention. Publishing special issues of *AJOT* related to some of these disorders would be useful in encouraging some of these authors to publish their work in *AJOT*.

Quality of Study Design

Of all the articles published on neurological rehabilitation, 40% were effectiveness studies and 10% were efficacy studies. The percentage of effectiveness studies published in 2010–2011 is very similar to that for the previous 2 yr (Gillen, 2010). Effectiveness and efficacy studies were rated by two criteria: Lieberman and Scheer (2002) and the Oxford Center for Evidence-Based Medicine (2012). According to these rating systems,

- *Level I* includes systematic reviews, meta-analyses, and randomized controlled trials with low bias;
- *Level II* includes randomized controlled trials with high bias (small sample size) and two-group nonrandomized trials (cohort or case-control studies);
- *Level III* includes single-group nonrandomized studies (pretest–posttest design);
- *Level IV* includes single-subject designs and case series; and
- *Level V* includes expert opinion without critical appraisal.

On the basis of this classification system, a majority of effectiveness and efficacy studies (60%) were single-subject design studies (Level IV) with 4 participants. One study was a nonrandomized cohort study with 13 participants (Page et al., 2011), 1 study was a small randomized trial (Hayner et al., 2010) with 12 participants, 2 studies were systematic reviews of 15 studies (Nilsen et al., 2010), and 10 were review studies (Kim & Colantonio, 2010). For the occupational therapy profession to achieve its *Centennial Vision* of becoming evidence based, researchers need to begin conducting and publishing more randomized controlled trials, which are accepted as the gold standard for clinical trial design.

Contribution to Occupational Therapy Practice

Among the articles reviewed were 2 Level I systematic reviews (Kim & Colantonio, 2010; Nilsen et al., 2010; see Table 2). One article reviewed the effectiveness of rehabilitation in community integration of people with TBI (Kim & Colantonio, 2010). The authors reviewed 10 studies, of which 3 were Level I, 2 were Level II, and 6 were Level III. Only 1 of the Level I studies and 3 of the Level III studies demonstrated a beneficial effect of multidisciplinary rehabilitation intervention on community integration. The review demonstrated that the effect of multidisciplinary rehabilitation intervention is as yet unclear. However, additional studies are indicated because some studies demonstrated beneficial effects (Kim & Colantonio, 2010).

The second Level I study was a review of the effect of mental practice combined with physical practice in improving motor function in people with stroke (Nilsen et al., 2010). Nilsen et al. (2010) reviewed 15 studies (4 Level I, 2 Level II, 1 Level III, 6 Level IV, and 2 Level V). Results of Level I and Level II studies demonstrated beneficial effects of combined mental and physical practice. This systematic review provided a clear rationale for improving occupational therapy practice in stroke rehabilitation. Given that practice patterns in the United States involve a limited number of occupational therapy sessions after stroke, the judicious use of mental practice as an adjunct will be beneficial in improving motor function (Nilsen et al., 2010).

Two studies (Hayner et al., 2010; Page et al., 2011) were on the effect of modified constraint-induced therapy, which has become increasingly accepted in occupational and physical therapy in stroke rehabilitation (Rao, 2010). The results of these studies included the following:

- A stratified randomized trial demonstrated that modified constraint-induced therapy was not different from bilateral therapy of equal intensity on motor function and occupational performance in people with subacute stroke (Hayner et al., 2010).
- A nonrandomized cohort study demonstrated that improvements seen as a result of modified constraint-induced therapy were not retained 3 mo after the end of intervention (Page et al., 2011).

One study examined the effect of occupational therapy intervention on function in people with multiple sclerosis through a retrospective chart review (Maitra et al., 2010). The study reported improvements in functional ability (seen as improvement in FIM™ score). A low correlation was reported between occupational therapy intensity and independence in self-care skills such as upper-extremity dressing and memory. However, because additional interventions were not controlled for, evaluating the specific role of occupational therapy in improving function was difficult.

The effectiveness studies published from 2010 to 2011 were overwhelmingly concerned with a limited number of neurological disorders. Most of the studies had small sample sizes and did not control for additional factors that could influence outcome.

Instrument Development and Testing

Four studies on instrument development and testing were pertinent to neurological rehabilitation, as shown in Table 3 (Classen, Witter, et al., 2011; Doig et al., 2010; Lehman, Sindhu, et al., 2011; Lehman, Woodbury, et al., 2011). All four studies examined functional assessments with high ecological validity. Two of the studies were concerned with the utility of the Disability of the Arm, Shoulder and Hand (DASH) in clinical occupational therapy practice.

1. Lehman, Woodbury, et al. (2011) examined the factor structure of the DASH through secondary analysis in a large sample of people with orthopedic or neurological problems. The study confirmed previous results that a single factor (relating to whole-arm movements) explained most of the variance, indicating that using the total score of the DASH was appropriate, rather than creating scores for whole-arm movements, fine hand movements, and symptoms.
2. Lehman, Sindhu, et al. (2011) examined whether using subscales of the DASH (whole-arm movements, fine hand movements, and symptoms) would be useful for clinical practice. As with the preceding study, the authors conducted a secondary retrospective analysis of a large sample. Although the division of the DASH into three subscales was not supported statistically, the authors suggested that each subscale may be useful for setting therapeutic goals.
3. Classen, Witter, et al. (2011) presented a framework for using clinical assessments to predict driving performance in people with Parkinson's disease. The study highlighted the importance of a simple test such as the Visual Field of View as a predictor of driving performance. Given the importance of predicting driving performance, this study is highly relevant to clinical practice.
4. Doig et al. (2010) examined the combined use of the Canadian Occupational Performance Measure and Goal Attainment Scaling in people with TBI. Combined use of the two instruments improved sensitivity to change and provided goals that were client centered, both important factors in choosing assessment tools.

Although only four studies on instrument development and testing were published in the past year, they were of high quality and used ecologically valid assessment tools that are very useful for occupational therapy practice.

Basic Research

In the past year, 6 basic research studies (Table 4) in neurological rehabilitation were published, two of which were on stroke (Schmid et al., 2011; Wu, Hermann, Ying, & Page, 2010). Their results included the following:

- Fear of falls was correlated with anxiety, depression, and lower quality of life among people with stroke (Schmid et al., 2011). This relationship highlights the importance of assessing and reducing fear of falls among people with stroke.
- Chronometry (time taken to complete a task) was not valid for mental practice because no clear agreement was found between the time it took to complete physical practice of a task and the time it took to complete mental practice of a task (Wu et al., 2010). Although mental practice is important in therapeutic practice, Wu et al. (2010) recommended against the use of chronometry.

Two studies were on TBI (Classen, Levy, et al., 2011; Goverover et al., 2010). Their results indicated the following:

- Combat veterans with TBI commit more driving errors, which increases the risk of road traffic accidents. Occupational therapists working with people with TBI, and with combat veterans in particular, should assess driving performance during the process of community reintegration (Classen, Levy, et al., 2011).
- People with TBI learn and retain functional skills better when the learning process is self-generated, highlighting the importance of patients' active involvement in the learning process (Goverover et al., 2010).

One study examined the lived experience of people with multiple sclerosis (Hwang et al., 2011) and highlighted the importance of self-concept, social support, and access to occupational therapists.

Finally, one study examined interview context and client motivation in people with Parkinson's disease (Takahashi, Tickle-Degnen, Coster, & Latham, 2010). The authors highlighted the importance of contextual factors to emotional expression that therapists should consider in working with people with Parkinson's disease. Overall, the basic research studies examined questions important to clinical practice, were well designed (with a reasonable sample size), and provided clear implications for occupational therapy practice.

Summary of Research

This article reviewed 20 studies in neurological rehabilitation published in *AJOT* in 2010–2011 in an effort to assess the contribution of occupational therapy research in general and of *AJOT* as the primary vehicle for this research in particular to the *Centennial Vision*. A few concerns emerged from this review of the published literature:

1. *Number of articles on neurological rehabilitation:* During the review period (May 2010–October 2011), only 18% of 116 published articles were related to neurological rehabilitation. Given that neurological rehabilitation is a prominent area of practice and research in occupational therapy, it is imperative to have more high-quality studies published in *AJOT*.
2. *Diversity of practice areas:* Most of the articles published during the review period were related to stroke rehabilitation. No articles on Parkinson's disease, spinal cord injury, Huntington's disease, and amyotrophic lateral sclerosis were published. It is important for published research to reflect the diversity of practice areas in occupational therapy.
3. *Quality of effectiveness research:* The majority of published effectiveness and efficacy studies were single-case designs, which are often seen in the early stages of development of knowledge in specific practice areas (Law & MacDermid, 2008). To achieve the *Centennial Vision* of producing evidence for clinical practice, it is important to improve the quality of research designs for use in randomized controlled trials.
4. *Choice of outcome measures:* During the publication period, several effectiveness studies used impairment-, activity-, and participation-level outcomes. However, some studies used only impairment-level measures. In the future, studies need to include activity- and participation-level measures because they are a major focus of occupational therapy practice.

Directions for the Future

AJOT is a premier journal of occupational therapy research and an important instrument in achieving the AOTA's *Centennial Vision*. Despite the generally high standard of research published in *AJOT*, a few notable concerns emerged. I have several recommendations for improving *AJOT*'s role in achieving the *Centennial Vision*:

1. *Increase the volume and diversity of research in neurological rehabilitation:* The limitations in number of studies and lack of diversity in populations are, in part, explained by the fact that occupational therapists and their collaborators publish studies in area-specific journals outside occupational therapy. It is important that researchers publish their findings in *AJOT* so as to reach a larger number of

occupational therapists. The publication of special issues and the Research Scholars Initiative will help to increase the volume and diversity of published research.

2. *Improve quality of research:* The need for improvement in the quality of effectiveness research is clear, including using more rigorous research designs such as randomized controlled trials. In addition, researchers need to routinely include outcome measures at the activity and participation level. The journal can help in this process by publishing editorial updates on research designs and appropriate use of statistical procedures.
3. *Structurally improve both the volume and quality of research:* Although AOTA (2009) has clarified the importance of scholarship and research in occupational therapy education, unified standards for teaching research methods in occupational therapy education are needed. Such uniform standards will ensure that occupational therapists are better trained in best practices for research methodology. An equally important issue concerns the time occupational therapists spend engaging in research activities. A recently published survey by AOTA (2010) reported that occupational therapy faculty members ($N = 519$) spent 10% of their time, on average, on research-related activities. The survey highlighted that time spent in research decreases with increasing years of experience. In the first 5 yr, faculty members spend 27% of their time on research. Faculty members with >5 yr of experience spend 10% time on research. Experienced faculty members should be encouraged to spend more time on research (either directly or through mentoring of junior faculty) so that academic centers maintain productivity. Clinicians ($N = 9,305$) spent <2% of their time on research activities (AOTA, 2010). Changes in health care have necessitated that clinicians work with larger numbers of patients, leaving little to no time for research activities. The profession needs to design creative ways to integrate research within clinical practice. For instance, using uniform standardized assessment tools and uniform effective interventions in groups of patients can lead to significant progress in examining effectiveness of occupational therapy interventions. To achieve the *Centennial Vision*, academicians and clinicians need to be enabled to spend greater time on effectiveness and efficacy research (Gutman, 2010a).

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Summary of Neurorehabilitation Research Published in the *American Journal of Occupational Therapy* from May 2010 to October 2011

Table 1

Author and Year	Type of Study		Level of Evidence	Instrument Development and Testing		Basic Research
	Effectiveness	Efficacy				
Beckelmeier, Dalton, Richter, Hermann, & Page (2011)		X	IV			
Classen, Levy, et al. (2011)			n/a	X		
Classen, Witter, et al. (2011)			n/a			X
Doig, Fleming, Kuipers, & Cornwell (2010)			n/a	X		
Goverover, Chiaravalloti, & DeLuca (2010)			n/a			X
Hardy et al. (2010)	X		IV			
Hayner, Gibson, & Giles (2010)	X		II			
Henshaw, Polatajko, McEwen, Ryan, & Baum (2011)	X		IV			
Hwang, Cvitanovich, Doroski, & Vajarakitpongse (2011)			n/a			X
Kim & Colantonio (2010)	X		I			
Lehman, Sindhu, Johnson, & Velozo (2011)			n/a	X		
Lehman, Woodbury, & Velozo (2011)			n/a	X		
Maitra et al. (2010)	X		IV			
McCall, McEwen, Colantonio, Streiner, & Dawson (2011)		X	IV			
Nilsen, Gillen, & Gordon (2010)	X		I			
Page, Murray, & Herman (2011)	X		III			
Schmid et al. (2011)			n/a			X
Takahashi, Tickle-Degnen, Coster, & Latham (2010)			n/a			X
Wu, Hermann, Ying, & Page (2010)			n/a			X
Wu, Radel, & Hanna-Pladdy (2011)	X		IV			

Note. n/a = not applicable; level of evidence pertains only to intervention studies (effectiveness and efficacy), not to instrument development and basic science studies.

Occupational Therapy Intervention Studies Published in the *American Journal of Occupational Therapy* From May 2010 to October 2011

Table 2

Author	Study Objectives	Level/Design/Participants	Intervention and Outcome Measures	Results	Study Limitations
Beckelheimer, Dalton, Richter, Hermann, & Page (2011)	To test the efficacy of computer-based training implementing rhythm and timing in chronic, severe, stroke-induced hemiparesis	Level IV Single-subject design N = 2, <12 mo poststroke Age >21, <75	<i>Intervention</i> Computer-based timing intervention with metronome; 60 min × 3 days/wk for 4 wk; total sessions = 12; total hr therapy = 12 <i>Outcome Measures</i> <ul style="list-style-type: none"> • UE section of FMA • AMAT • COPM • Stroke Impact Scale 	Some improvement seen in all outcome measures.	Case series design with 2 participants No statistical analysis
Hardy et al. (2010)	To examine the effect of functional training, bracing, and electrical stimulation on reducing UE spasticity	Level IV Single-subject design N = 2; chronic stroke >6 mo	<i>Intervention</i> Clinic treatment: Electrical stimulation while wearing brace followed by repetitive task-specific training Home-based treatment: Two 30-min sessions of electrical stimulation in brace, followed by overnight wearing of brace without stimulation 45–60-min sessions 2 days/wk for 5 wk; total hr = 10 <i>Outcome Measures</i> <ul style="list-style-type: none"> • Modified Ashworth Scale (UE portion) • FMA (UE portion) • Box and Block test • AMAT 	Reduction in finger spasticity level seen on Modified Ashworth Scale. Slight improvement in Box and Block test and AMAT.	Small sample Poor generalizability
Hayner, Gibson, & Giles (2010)	To compare the effect of mCTT with bilateral therapy of equal intensity in improving motor function after stroke	Level II Stratified, randomized trial N = 12; >6 mo poststroke	<i>Intervention</i> mCTT group wore a mitt and practiced functional activities with affected arm Bilateral group were given repetitive and intrusive cues to use both arms in functional activities Both groups: 6 hr/day for 10 days; total hr = 60	Both groups improved performance; no differences were seen between groups.	Well-designed study Small sample size Results not presented clearly

Author	Study Objectives	Level/Design/Participants	Intervention and Outcome Measures	Results	Study Limitations
Henshaw, Polatajko, McEwen, Ryan, & Baum (2011)	To provide description of new cognitive approach to lay groundwork for a future clinical trial	Level IV	<i>Outcome Measures</i> • WMFT • COPM	Performance and satisfaction improvement seen in both cases after treatment. Cases tolerated treatment procedure.	Case series design with 2 participants No statistical analysis
		Single-subject design <i>N</i> = 2; mild to moderate stroke; age >40 yr	<i>Intervention</i> Cognitive approach involving dynamic performance analysis and problem-solving strategy of goal-plan-do-check <i>Outcome Measures</i> • Performance quality rating scale • Descriptive outcomes		
Kim & Colantonio (2010)	To examine whether rehabilitation is effective in community integration of survivors of traumatic brain injury (TBI)	Level I	<i>Intervention</i> Multidisciplinary rehabilitation or intensive cognitive rehabilitation program	Of 3 Level I studies, only 1 showed improvement. The Level II study did not demonstrate benefits.	Comprehensive review of 17-yr period Review included non-RCT studies
		Systematic review <i>N</i> = 10 studies; 3 Level I; 1 Level II; 6 Level III	<i>Outcome Measures</i> • Community Integration Questionnaire • Brain Injury Community Rehabilitation Outcome-39	Of the 6 Level III studies, 3 showed benefit of rehabilitation. Benefit of multidisciplinary rehabilitation in community integration is unclear.	Effectiveness not specific to occupational therapy Included patients with mild TBI
		Adults with TBI of varying severity and time since injury			
Maitra et al. (2010)	To understand how occupational therapy interventions enable patients with multiple sclerosis to improve function in an inpatient setting	Level IV	<i>Intervention</i> Occupational therapy intervention (self-care, therapeutic exercise, occupation-based therapeutic activities) was correlated with FIM scores <i>Outcome Measure</i> FIM	Poor correlation between occupational therapy intensity and UE dressing and memory. Poor correlation between self-care training and independence in ADLs.	Poor correlation between occupational therapy intervention and improvement in FIM score No control over additional interventions
		Retrospective chart review <i>N</i> = 193			
McCall, McEwen, Colantonio, Streiner, & Dawson (2011)	To examine the efficacy of a mCIT protocol on participation, activity, and impairment in the older adult subacute stroke population	Level IV	<i>Intervention</i> mCIT, 2 hr/day for 10 days; total sessions = 10; total hr = 20. Treatment included shaping during functional activity; constrained by mitt. ARAT scores improved.	COPM and CAHAI scores improved for 4 of 4 participants. FIM self-report improved for 3 of 4 participants. <i>Outcome Measures</i> • COPM • FIM self-report • Chedoke Arm and Hand	Case series design No statistical analysis Small sample size
		Interrupted time series <i>N</i> = 4; age >65 yr, 43–81 days poststroke			

Author	Study Objectives	Level/Design/Participants	Intervention and Outcome Measures	Results	Study Limitations
Nilsen, Gillen, & Gordon (2010)	To examine whether mental practice is effective in improving UE function after stroke	Level I Systematic review N = 15 studies: 4 Level I; 2 Level II; 1 Level III; 6 Level IV; 2 Level V Chronic stroke	<i>Intervention</i> Mental practice alone or in combination with CIMT and functional training <i>Outcome Measures</i> <ul style="list-style-type: none">FMAWMFTMotor Activity LogARATJebsen-Taylor TestMotricity IndexKinematic analysisPegboard testPinch strengthStroke Rehabilitation Assessment of MovementChedoke-McMaster Stroke Assessment	<ul style="list-style-type: none">Activity Inventory (CAHAI)ARAT Level I and II studies reported improvement after mental and physical practice.	Comprehensive review of studies over 25 yr Review included RCT and non-RCT studies Selection bias Poor rating system for studies
Page, Murray, & Herman (2011)	To examine whether mCIT intervention is retained 3 mo after intervention in stroke rehabilitation	Level IIb Nonrandomized cohort study N = 13 adults >3 mo poststroke; minimal cognitive impairment; minimal spasticity	<i>Intervention</i> mCIT for 0.5 hr, 3x/wk for 10 wk (total hr of therapy = 15); treatment included shaping during functional activity; unaffected arm restrained in sling <i>Outcome Measures</i> <ul style="list-style-type: none">ARATFMA, Motor Recovery	No differences in ARAT or FMA scores seen between posttreatment and 3-mo follow-up.	Design not RCT No information on what participants did postintervention Small sample size Outcomes only impairment level
Wu, Radcl, & Hanna-Pladdy (2011)	To test performance and perception after combined physical and mental practice in a patient with hemiparesis and apraxia	Level IV Single-subject design N = 1; mild to moderate stroke <6 mo	<i>Intervention</i> Practice of reaching to grasp a cup and turning pages; physical practice followed by mental practice; 60 min x 3 days/wk x 6 wk; total number of sessions = 18; total hr therapy = 18	Performance and time taken to complete task improved after intervention.	Single-subject design Poor generalizability

Author	Study Objectives	Level/Design/Participants	Intervention and Outcome Measures	Results	Study Limitations
			<i>Outcome Measures</i> <ul style="list-style-type: none">• AMAT• COPM		

Note. ADLs = activities of daily living; AMAT = Arm Motor Activity Test; ARAT = Action Research Arm Test; CIMT = constraint-induced movement therapy; COPM = Canadian Occupational Performance Measure; FMA = Fugl-Meyer Assessment; mCIT = modified constraint-induced therapy; RCT = randomized controlled trial; WMFT = Wolf Motor Function Test; UE = upper extremity.

Table 3
Studies on Instrument Development and Testing in the *American Journal of Occupational Therapy* From May 2010 to October 2011

Author	Study Objectives	Design and Participants	Intervention and Outcome Measures	Results	Study Limitations
Classen, Witter, et al. (2011)	To develop a framework for predictive model for on-road performance	Prospective 2-group comparison study $N = 82$; Parkinson's disease (PD), $n = 41$; control group, $n = 41$ Age >65 yr	<i>Outcome Measures</i> <ul style="list-style-type: none"> Unified Parkinson's Disease Rating Scale Mini-Mental State Examination Visual Sensory Testing Useful Field of View (UFOV) Rapid Paced Walking (RPW) Global Rating Score (driving) Sum of maneuvers score (driving) 	Participants with PD performed worse on UFOV and RPW tests and the on-road driving test. UFOV correlated with driving test and correctly identified 81% of those who failed the driving test. Visual perception and attention as well as RPW are important predictors of driving.	Well-designed study, but neuropsychological tests of visual-motor perception or executive function tests not included
Doig, Fleming, Kuipers, & Cornwell (2010)	To examine clinical utility of combined use of the Canadian Occupational Performance Measure (COPM) and Goal Attainment Scaling (GAS)	Pretest-posttest within-subject design $N = 28$; 14 patients with severe traumatic brain injury discharged from inpatient rehabilitation and 14 significant others	<i>Intervention</i> Outpatient 12-wk occupational therapy program. Performance and satisfaction ratings collected before and after program. <i>Outcome Measures</i> <ul style="list-style-type: none"> COPM performance and satisfaction score GAS T score Client-Centeredness of Goal Setting Questionnaire Self-Awareness of Deficits Interview Change Awareness Questionnaire 	COPM and GAS ratings were significantly different from pretest to posttest. Agreement between the two scales for 70% of participants. Indicates utility of combined administration of COPM and GAS.	Well-designed study but with small sample size Sensitivity to change and sensitivity (part of validity) not clarified
Lehman, Sindhu,	To examine how the DASH could be used as a clinically useful data collection form	Secondary analysis cross-sectional study $N = 960$ from outpatient orthopedic clinics	<i>Intervention</i> No intervention; data collected at admission and discharge Three sections (gross movements, fine movements, and symptoms) were arranged in order of difficulty. Rating for each patient placed relative to person's	Although prior study did not confirm three factors in DASH, authors	Useful tool for clinical research and practice

Author	Study Objectives	Design and Participants	Intervention and Outcome Measures	Results	Study Limitations
Johnson, & Velozo (2011)		N = 960 from outpatient orthopedic clinics	Three measures (gross movements, fine movements, and symptoms) were arranged in factor ratings for each patient placed relative to person's ability; difficult items listed as therapeutic goals.		
Lehman, Woodbury, & Velozo (2011)	To examine the factor structure of the DASH across a wide range of participants with UE orthopedic or neurological problems	Secondary analysis of cross-sectional study N = 991 with UE orthopedic or neurological problems	<i>Intervention</i> No intervention; data collected at admission and discharge <i>Outcome Measures</i> Exploratory factor analysis and confirmatory factor analysis	Three factors emerged: one relating to whole arm movements, one to fine hand movements, and one to symptoms; however, only the first factor was large enough to account for 61% of variance.	Confirms prior findings of a large single factor in DASH Study of high quality

Note. DASH = Disability of the Arm, Shoulder and Hand; UE = upper extremity.

Table 4
Studies on Basic Research in the *American Journal of Occupational Therapy* From May 2010 to October 2011

Author	Study Objectives	Design and Participants	Intervention and Outcome Measures	Results	Study Limitations
Classen, Levy, et al. (2011)	To examine differences in driving between combat veterans with traumatic brain injury and post-traumatic stress and healthy controls	Prospective, 2-group study $N = 38$; combat veterans, $n = 18$; control group, $n = 20$	<p><i>Intervention</i> No intervention.</p> <p><i>Outcome Measures</i></p> <ul style="list-style-type: none"> Mini-Mental State Examination Trail Making Test Part B Visual acuity Peripheral Field Test Useful Field of View Center for Epidemiologic Studies Depression Scale 	Control participants made more signaling errors. Combat veterans made errors in speed regulation and adjusting to stimuli. Of veterans, 44% had impaired depth perception. Veterans had lower cognitive scores than controls. Cognitive skills, age, and gender were associated with driving errors.	Did not use regression for predictive analysis
Goverover, Chiaravalloti, & DeLuca (2010)	To examine whether self-generation improved recall and performance of functional tasks	Prospective, 2-group study $N = 25$; group with traumatic brain injury (TBI), $n = 10$; control group, $n = 15$	<p><i>Intervention</i> Healthy participants and participants with TBI practiced a cooking and a finance task with instructions provided or self-generated.</p> <p><i>Outcome Measures</i></p> <ul style="list-style-type: none"> <i>Attention:</i> Digit Span subtest of the Wechsler Adult Intelligence Scale—Revised <i>Processing speed:</i> Symbol Digit Modalities Test, Oral Version <i>Learning and memory:</i> California Verbal Learning Test, recall of items in cooking and financial task <i>Executive function:</i> Trail Making Test, Verbal Fluency Test (Letter Fluency), Color–Word Interference Test 	<p>At baseline, participants with TBI performed worse on executive function, learning, and memory tests.</p> <p>Self-generation improved immediate recall, but there was no retention 1 wk later.</p> <p>Self-generated learning was better for immediate retention among participants with TBI.</p>	Small sample size Severity of TBI not accounted for
Hwang, Cvitanovich,	To determine how factors of the lived experience of	Prospective, cross-sectional survey	<i>Intervention</i> No intervention	Moderate correlation seen between LMSQoL and adjusted self-reported disability support; low correlation	Small sample size

Author	Study Objectives	Design and Participants	Intervention and Outcome Measures	Results	Study Limitations
Doroski, & Vajarakitpongse (2011)	multiple sclerosis correlate with quality of life	$N = 66$ living in the community	<p><i>Outcome Measures</i></p> <ul style="list-style-type: none"> Leeds Multiple Sclerosis Quality of Life scale (LMSQoL) Multiple sclerosis adaptation scale 	<p>and adjusted self-concept and social support; low correlation with accessibility.</p> <p>Highlights the importance of adjusted self-concept, social support, and accessibility to occupational therapy practice.</p>	<p>Contextual factors such as socioeconomic status not controlled</p> <p>Correlation analysis prevents assessment of cause-and-effect relationship between QoL and adaptation factors</p>
Schmid et al. (2011)	To assess change in fear of falls in the first 6 mo poststroke; compare anxiety, depression, balance, and quality of life in people with and without fear of falls	<p>Prospective longitudinal study</p> <p>$N = 28$ at baseline; $N = 18$ at 6-mo follow-up</p>	<p><i>Intervention</i></p> <p>No intervention</p> <p>Assessments administered at baseline and at 6 mo</p> <p><i>Outcome Measures</i></p> <ul style="list-style-type: none"> Modified Rankin Scale Modified Falls Efficacy Scale Falls Efficacy Scale Berg Balance Scale Generalized Anxiety Disorder-7 Patient Health Questionnaire-9 Stroke Specific Quality of Life Scale 	<p>Fear of falls decreased and balance improved in 6 mo.</p> <p>Higher fear of falls was associated with higher anxiety, depression, and lower quality of life but not with balance.</p> <p>Anxiety and depression are related to fear of falls after stroke.</p>	<p>Well designed 6-month longitudinal study but with small sample size and large number of dropouts at follow-up</p>
Takahashi, Tickle-Degnen, Coster, & Latham (2010)	To examine whether qualities of interview context are associated with motivational behavior clients in Parkinson's disease (PD)	<p>Descriptive and relational design</p> <p>$N = 106$ with moderate PD</p> <p>Time since diagnosis = 6.8 ± 5.8 yr</p>	<p><i>Intervention</i></p> <p>No intervention</p> <p>Participants discussed an enjoyable activity or a frustrating activity with male or female interviewers.</p> <p><i>Outcome Measures</i></p> <ul style="list-style-type: none"> Motivation Verbal behavior Nonverbal behavior patterns 	<p>PD subjects used more positive language and greater emotion in discussing enjoyable activities and were apathetic when discussing frustrating activities.</p> <p>Contextual factors influence emotional expression in PD.</p>	<p>Well-designed study with large sample size, but participants not randomized to gender of interviewer</p>

Author	Study Objectives	Design and Participants	Intervention and Outcome Measures	Results	Study Limitations
Wu, Hermann, Ying, & Page (2010)	To determine whether chronometry is appropriate for mental practice	Cross-sectional study $N = 18$ with chronic stroke (>12 mo) Range = 15–215 months poststroke	<i>Intervention</i> Participants physically practiced functional tasks followed by mental practice of each task <i>Outcome Measure</i> Time taken to complete each task for physical and mental practice	Time taken to physically practice tasks was longer than mental practice of same task. Chronometry does not appear to be valid for mental practice in stroke.	Small sample size Small number of practice trials