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RUNNING HEAD: Outcome Measure Use in Occupational Therapy

**Outcome Measure Use in Occupational Therapy for Upper Extremity
Rehabilitation: Results of a Survey of Therapist Clinical Practices**

Cortney L. Bohnen

A thesis submitted in partial fulfillment of the requirements for the degree of Master of
Arts in Occupational Therapy, St. Catherine University, St. Paul, Minnesota

May, 2011

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**St. Catherine University
Master of Arts in Occupational Therapy
Certification of Successful Thesis Defense**

We, the undersigned, certify that

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**Outcome Measure Use in Occupational Therapy for Upper Extremity
Rehabilitation: Results of a Survey of Therapist Clinical Practices**

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Abstract

Occupational therapists can work in a variety of settings, and therefore use multiple frames of references, models of practice, and different outcome measures based on the populations they are treating. This study includes a literature review of the outcome measures used in occupational therapy and hand therapy, as well as the frames of references used, and the goal setting strategies employed in hand therapy. The purpose of this study is to identify assessments and outcomes measures used by occupational therapists specializing in hand therapy practice and to determine if that choice is affected by their chosen frames of reference, membership in professional organizations, and the measurement tools identified in their professional journals. This study benefits the occupational therapy community because it provides information on current trends in assessment and outcome measurement used for clients with upper extremity injuries and the primary frames of references therapists use with their clients. This study helps occupational therapists working primarily as hand therapists better understand their own practice by providing information that supports, recognizes, and reflects on the methods they use in treatment.

A survey was sent to 154 hand therapists in Minnesota. The results of this study indicated that few therapists differentiated between assessments and outcome measures and that frequently used assessment tools were also frequently identified as outcome measures. The survey results indicate 94% of therapists using the DASH or QuickDASH identified it as both an assessment and an outcome measure. Goal attainment and self

report on progress were also identified by some respondents as an outcome measure. The biomechanical frame of reference was frequently used regardless of practice setting or experience and the majority of assessments and outcomes identified reflect this frame of reference (FOR). Other models and FORs therapists identified using were not represented in assessment or outcome measures selection. Therapists with less experience used a broader range of models and FOR, while therapists with over 15 years of experience identified very few. Three primary goal setting strategies with varying levels of client-centeredness were used by over 63% of respondents and included: Goals being set during specific client discussion, goals being set based on assessment results and are then described to client, and goals written based on client comments and in response to written self report assessments.

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Introduction

Measuring the results of intervention is an important component of the occupational therapy process, and obtaining reliable and valid information through the use of standard assessments provides a level of support that can justify the need for occupational therapy services for the community (Gutman, Mortera, Hinojosa, & Kramer, 2007). In occupational therapy, outcome measures are instruments used to measure changes in the status of patients and are either clinician based measures, self report measures, or economic measures (Salerno, Copley-Merriman, Taylor, Shinogle, & Schultz, 2002). The purpose of this study is to identify assessments and outcomes measures used by occupational therapists specializing in hand therapy practice and determine if that choice is affected by their chosen frames of reference, membership in professional organizations, and the measurement tools identified in their professional journals. It will also review goal setting strategies employed in practice.

Membership in professional organizations and years of experience may influence therapists' view of the therapy process as the frames of references used in a profession are chosen based on their values and core beliefs and emphasis on various approaches may change over time. Review of the difference in mission and values of the American Occupational Therapy Association (AOTA) and the American Society of Hand Therapists (ASHT) illustrated how the frame of reference and viewpoints can shift between occupational therapists and hand therapists.

Occupational therapists are employed in many practice areas, and hand therapy is one of the specialty areas within the larger profession of occupational therapy. With such a specific area of focus and only a small portion of occupational therapists in this field, it is important to have strong communication between practitioners so they can learn from each other and from the literature available about the treatment of the upper extremity and the emerging developments in both areas. To effectively analyze the results of outcome measures, hand therapists need to agree on what elements are important to measure and a need for precision and accuracy in the way the measurements are done (Amadio, 2003).

Differences in occupational therapy and hand therapy can be identified through review of missions and visions of the related professional organizations as well as the range of practice models and frames of reference therapists use, the assessments and outcome measures found in their professional journals or academic texts, and how they link to the assessment and outcome measures available to therapists as they complete goal setting and client centered practice.

This study benefits the occupational therapy community by providing information on current trends in assessment and outcome measurement and the primary frames of references therapists use for clients with upper extremity injuries. This study helps occupational therapists working primarily as hand therapists better understand their own practice by providing information that supports recognition and reflection on the methods they use in practice.

Review of Literature

Professional Organizations

Professional organizations are an essential part of the life-long developmental process of an occupational therapist. While the accumulation of knowledge begins in the classroom, professional identity continues to develop throughout the professional's life. Organizations such as the American Occupational Therapy Association or the American Society of Hand Therapists set standards for the profession's code of ethics and scope of practice. They also support the individual professionals and the profession as a whole (Brayman, et al., 2009). Finding a professional identity and being part of a professional organization can help guide practice and assist the occupational therapist in choosing outcome measures that best align with the values, models, and frames of reference of their chosen organization and population.

American Occupational Therapy Association. The American Occupational Therapy Association (AOTA) is the national professional association established in 1917 to represent the interests and concerns of occupational therapy practitioners and students of occupational therapy and to improve the quality of occupational therapy services. AOTA's major programs and activities are directed toward assuring the quality of occupational therapy services, improving consumer access to health care services, and promoting the professional development of members (American Occupational Therapy Association [AOTA], 2010). AOTA educates the public and advances the profession by providing resources, setting standards, and serving as an advocate to improve health care.

Occupational therapists and occupational therapy assistants follow professional practice standards and adhere to a code of ethics in the delivery of their services (AOTA, 2010).

Current key AOTA initiatives for occupational therapy are 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, 2010, para. 7). This is manifested by a major image-building campaign to more effectively explain occupational therapy to a variety of audiences, engage in broad-based advocacy to ensure funding for occupational therapy in traditional and emerging practice areas, and make stronger linkages among occupational therapy research, education, and practice to enable effective communication within and about the profession, as well as building a cutting edge research agenda for the profession, and a model for curriculum (AOTA, 2010). Development of occupational therapy outcome measures to meet the growing demands of consumers, payers, and policymakers, and demonstrating the value of occupational therapy are also key initiatives of the profession (AOTA, 2010).

Occupational therapy practitioners take a holistic view of their clients; their physical diagnoses, their cultural values, their everyday roles, and above all, their goals and aspirations in order to develop and execute plans for helping people live to their fullest potential (AOTA, 2006). With its unique approach and perspective, occupational therapy can do much to meet the needs of society. This includes providing cost-effective, client-centered solutions to promote productive aging for the population, foster healthy development among children and youth, and help people with illnesses or injuries regain, develop, and build skills that are essential for independent functioning, health, and well-being (AOTA, 2006). The American Occupational Therapy Association promotes a client

centered occupation based approach to working with a wide range of clients using a variety of models and frames of references.

American Society of Hand Therapists. The American Society of Hand Therapists (ASHT), created in 1977, is a professional organization comprised of licensed occupational and physical therapists who specialize in the treatment and rehabilitation of the upper extremity (Olivett, 2011). The primary goal of hand therapy is to maximize activities and participation in life situations for individuals with disease or injuries of the upper extremity (MacDermid, et al., 2002). ASHT advances the science of hand therapy through communication, education, and advocacy (American Society of Hand Therapists [ASHT], 2010). Some ASHT members have earned the advanced designation, Certified Hand Therapist (CHT), which they have obtained through training and an evidence of their competency. Dedication to support the best research in the field has been a key part of ASHT's mission and vision since its creation, and is seen as critical to improvement of quality of care and clinical practice (ASHT, 2010).

AOTA and ASHT Mission and Vision. The mission of AOTA is to “advance the quality, availability, use, and support of occupational therapy through standard-setting, advocacy, education, and research on behalf of its members and the public” (AOTA, 2010, para. 5). This differs significantly from the ASHT mission statement: “To be the recognized leader in advancing the science and practice of hand therapy through education, advocacy and clinical standards” (ASHT, 2010, para. 2). AOTA presents a more holistic, client-centered, community based approach to their practice, which is evident in their vision statement “AOTA advances occupational therapy as the preeminent profession in promoting the health, productivity, and quality of life of

individuals and society through the therapeutic application of occupation” (AOTA, 2010, para. 6), while ASHT focuses on the professionals in the organization, which they feel will help strengthen the profession from the inside out, stating in their vision statement that “ASHT builds and supports the community for professionals dedicated to the excellence of hand therapy” (ASHT, 2010, para. 3).

Based on the mission and vision statements, it appears that AOTA has an overall holistic, community centered focus, whereas ASHT has a research and education focus for the hand therapy professionals, which focuses mainly on specific body structures. The values of the institutions may influence the frame of references employed and the models of practice used by the practitioners in their given field of practice. Models of practice and frames of references most commonly used by both professions may be accessed through their affiliated journals and the text books used in occupational therapy education (see Appendices A and B).

Models of Practice and Frames of Reference

In occupational therapy, there are a variety of models and frames of reference a therapist can utilize as a way to structure interventions and make decisions to insure optimal patient care. A model delineates and defines the scope or area of concern for a profession and is derived from the profession’s paradigm where it articulates the overall beliefs and knowledge of the profession and functions to define the scope of practice (Crepeau, Schell, & Cohn, 2009). A frame of reference guides practice by delineating the beliefs, assumptions, definitions, and concepts within a specific area of practice and is drawn from a theoretical base. Furthermore, it has a particular view of the function/dysfunction continuum and delineates evaluation processes and intervention

strategies that are consistent with the theoretical base and functions to guide a specific area of practice (Crepeau, et al., 2009). The various frames of reference used in practice with clients are significant contributions to our applied body of knowledge. They provide important information for intervention and need ongoing development and refinement. They also provide a set of definitions and descriptions to guide critical thinking. A frame of reference is put in place to establish and facilitate practice for therapists, and they typically do not contain the rigorous definition and clarification of concepts and concept relationships needed for research (Kramer, Hinojosa, & Brasic, 2003). Models and frames of references can be used in collaboration with one another or they can stand alone. Occupational therapy literature varies somewhat as to which approaches are considered models and which are frames of reference.

Models of Practice. There are many different models that occupational therapists employ in practice. Occupational therapy models of practice include occupation and describe how, in a holistic manner, factors influence an individual's engagement in occupation. According to O'Brien and Solomon in 2006, four of the predominant models of practice used in occupational therapy are Person-Environment-Occupation (PEO), Model of Human Occupation (MOHO), Occupational Adaptation (OA), and the Canadian Model of Occupational Performance (CMOP).

The PEO model developed by Law et al. in 1996 includes person, environment, and occupation and defines occupations as the everyday things people do. PEO looks at the person in terms of physical, social, and emotional factors, and the environment or contextual influences on the person and their occupations (O'Brien & Solomon, 2006).

The Model of Human Occupation (MOHO), developed by Gary Kielhofner and colleagues in 1985, includes the components of volition, habituation, performance, and environment. The human is seen as an open volition driven system, and the clinician's role is to understand the client in terms of systems and subsystems and intervene to facilitate engagement in occupation (O'Brien & Solomon, 2006).

The Occupational Adaptation (OA) model, developed by Schade & Schultz in 1992, is based on the components of occupations, physical and emotional strengths and weaknesses, and examination of available physical and emotional support systems to help people participate in their desired occupations by adapting or modifying the occupation or by using other methods to perform the occupation (O'Brien & Solomon, 2006).

The Canadian Model of Occupational Performance (CMOP) was developed in 1990 by the Canadian Association of Occupational Therapists (CAOT) and includes spirituality, occupation, and context; including institutional contexts. The worth of the individual is central to this model, and spirituality is the core of the person. Occupational therapy practitioners are encouraged to understand the client's spirituality to facilitate engagement in occupations that take place within social, physical, and cultural environments (O'Brien & Solomon, 2006; Law & Baum, 2005).

Frames of Reference. There are many different frames of reference that occupational therapists employ to best treat their adult clients. These include but are not limited to biomechanical, neurodevelopmental, rehabilitative/remediative, compensatory, cognitive disabilities, sensorimotor, and motor control (O'Brien, 2010).

The biomechanical frame of reference, defined by Pedretti and Paszunielli (1990), is focused on improvement of strength, endurance, and range of motion (ROM)

(O'Brien & Solomon, 2006). The biomechanical frame of reference applies principles of physics to human movement and posture with respect to the forces of gravity (Cole & Tufano, 2008) and is the frame of reference identified by recent occupational therapy graduates as the approach most frequently used in practice (National Board of Certification in Occupational Therapy [NBCOT], 2004).

The neurodevelopmental approach proposed by Bobath and revised by Schoen and Anderson focuses on impairments associated with central nervous system injury and theorizes that motor learning occurs when clients feel normal movement patterns (O'Brien & Solomon, 2006). This frame of reference was developed from techniques for decreasing abnormal reflex activity and muscle tone to increase control of normal patterns of movement for individuals with hemiplegia (Levit, 2008) using clinician handling techniques at key points of control to inhibit abnormal muscle tone and facilitate normal movement (O'Brien & Solomon, 2006).

The Sensorimotor frame of reference, developed by Trombly in 1994 promotes use of sensory input to change the muscle tone or promote a muscle contraction, and also focuses on populations with CNS injuries; using treatment modalities that include icing, neutral warmth, slow stroking, and vibration (O'Brien & Solomon, 2006).

The Motor Control frame of reference of Shumway-Cooke and Woollacott, 2007, is based upon dynamical systems theory, where to achieve motor skill, all systems, including sensory, motor, and cognitive, must work on each other for movement to occur.

The Contemporary Task-Oriented approach designed by Mathiowetz and Bass-Haugen (1994) promotes learning of motor skills by repeating the desired occupation in the most natural setting as a treatment modality (O'Brien & Solomon, 2006; Law &

Baum, 2005). This approach is client centered and occupation based, suggesting that the client should have active involvement in treatment. This may have variable applications in acute settings or for clients with significant cognitive impairments. This approach emerges from a systems model of motor behavior and is influenced by recent developmental and motor learning theories and exercise science literature (Bass-Haugen, Mathiowetz, & Flinn, 2008).

Goal Setting

The Occupational Therapy Practice Framework (OTPF) identifies goal setting as part of the development of the occupational profile. Occupational therapists who are conducting a client centered treatment will gather information to understand what is important and meaningful to the client. Refinement of the information collected during the creation of their occupational profile will develop the intervention plan and identify client centered outcomes. Clients identify occupations that give meaning to their lives and then select the goals and priorities that are important to them. Valuing and respecting the client's collaboration in therapeutic process helps foster client involvement and will more efficiently guide interventions (AOTA, 2008). Current approaches in occupational therapy look at goal setting from a less medical model or reductionist approach, rather promoting client evaluation methods that use a top down/bottom up approach (Slaydk, 2010). Strategies in setting goals emphasize the occupational therapy client centered process to focus the interaction on meaningful, measureable, and achievable short and long term goals. Both occupational therapists working in adult physical medicine settings and those specializing in hand and upper extremity treatment employ goal setting strategies with clients (MacRae & Croninger, 2010).

Outcome Measures

Measurement activities compromise 20% of a therapist's time and are ranked the most critical part of daily practice (Schoneveld, Wittink, & Takken, 2009). Outcomes identify what the client will be able to do functionally as a result of the intervention (MacRae & Croninger, 2010). A functional outcome should reflect the AOTA Occupational Therapy Practice Framework (OTPF) in that it should be seen as contributing to an improved occupational performance that promotes social participation of the client (AOTA, 2008). An assessment tool is designed to observe, measure, and inquire about factors that support or hinder occupational performance and is defined as specific tools or instruments used during the evaluation process (AOTA, 2008). Some assessment tools such as grip strength or range of motion are also used as outcome measures to document change in a body structure being measured; however there is a shift from focusing on components as the goal of intervention to a more top-down holistic approach that aims for measurement of improved occupational performance (MacRae & Croninger, 2010).

Occupational therapists need to understand categories of outcome measures, and determine the appropriateness of fit and purpose as outcome measures, which are sometimes seen as belonging to the realm of research, not clinical practice (Groth, Amadio, Chung, & MacDermid, 2002). Outcome measures have resulted in part from the managed care push in the health care system, with managed care companies scrutinizing costs to make sure they are receiving value for their expenditures. Outcomes also notify the third-party reimbursor of the functional reason behind the goal formation (MacRae & Croninger, 2010). If occupational therapists use evidence based outcome measures, the

insurance companies will have the opportunity to see the research behind the measures used and be more likely to support occupational therapy reimbursement. The more evidence occupational therapists have behind their practice the stronger the profession will get because they will get recognition for using reason based on research for the choices they make in their practice.

Outcomes measures can be separated into categories that range from body structure to activity limitation or participation resumption (MacDermid, 2002). They can include clinician based measures, self reported measures, economic measures, populations treated, structural or functional measures (Salerno, Copely-Merriman, Taylor, Shinogle, & Schulz, 2002). A clinician based measure can include electrophysiological tests, functional assessments such as performance ratings, pinch and grip strength, and range of motion; laboratory tests such as blood tests; physical examinations such as the Phalen's test and Tinel's sign; and radiographic studies.

Self reported measures can include functional status instruments such as performance ratings, activities of daily living, disability and handicap; depression, global health impression, health related quality of life questions such as a satisfaction survey, and symptoms.

Economic measures can include health management such as direct and indirect costs; return to work such as full or part time appointment and type of position; benefit determination, such as workers' compensation and disability insurance and utility measures (Salerno, et al., 2002).

Reliability and Validity. Reliability and validity are important considerations for evaluation of outcome measures because they indicate if the outcome measure is

assessing what it is supposed to measure and if it will measure the data in a consistent manner (Dowrick, Gabbe, Williamson, & Cameron, 2005). Reliability refers to the ability of an instrument to yield consistent and reproducible test results. Test-retest analyses indicate the reproducibility of results when an instrument is repeatedly administered over a period of time when no significant change occurs. Intra-class correlation (ICC) or kappa coefficients are commonly used to indicate reliability.

Validity refers to whether an instrument truly measures what it aims to measure. Criterion validity refers to the correlation of a measure with a gold standard, or measure previously proven to be valid and reliable. Content and construct validity are most relevant when evaluating patient self-evaluation instruments. Content validity is a qualitative assessment, performed by experts, of whether the instrument contains items relevant to its intended purpose. Construct validity involves the investigation of logical relationships between the new instrument and theoretical concepts or constructs (Dowrick, Gabbe, Williamson, & Cameron, 2005).

Responsiveness refers to the ability of an instrument to detect change when change occurs. This may be limited by ceiling and/or floor effects. Ceiling effects occur when the ability to record improvement is limited by the maximum obtainable value of a score. Floor effects occur when the ability to record deterioration is limited by the minimum obtainable value of a score (Dowrick, Gabbe, Williamson, & Cameron, 2005). Using valid and reliable measures are important for the profession because occupational therapists need to use outcome measures that are evidence based. If occupational and hand therapists use measures that are reliable, as studies are done and results of treatment are assessed, the data can be analyzed and measured against other data. Through using

outcome measures which are reliable and valid, the profession will have more evidence based practice to back up their treatments and practice methods.

Outcome Measures in Occupational Therapy. Occupational therapists use a range of models, frames of references, assessments and outcome measures. This is potentially influenced by their professional education, ongoing professional development, membership in professional organizations, and the needs of their clients. Populations served by occupational therapists vary widely and include children, adults, seniors, health and wellness, mental health, productive aging, rehabilitation, disability and participation, and work and industry (AOTA, 2010).

In occupational therapy, there are a variety of outcome measures that are employed in practice. Each type of practice setting has their own measures that are unique to the populations they are treating, and the goals of that particular therapy. The outcome measures used in occupational therapy settings include measures that assess cognition, emotional status, functional ability, balance, interests, and living skills (see Appendix B).

Several models of practice and frames of references have outcome measures which are typically associated or used in relation to them. The outcome measures used reflect the concepts related to the model or frame of reference. For example, the Model of Human Occupation (MOHO) is identified by Law and Baum (2005) as having three key measurement issues; routines and habits, motivation for activities and tasks, and the meaning of the activity and choice of occupation. There are a variety of different outcome measures that align with the model, including approaches that assess communication, motor skills, occupational functioning, interests and activities.

The biomechanical frame of reference approaches include measures of motion, strength, endurance, sensation, and other component parts. The Canadian Model of Occupational Performance (CMOP) uses the Canadian Occupational Performance Measure (COPM) as a measurement outcome, as well as the Self-Identified Goal Assessment (SIGA) that focuses on client goal identification (Tickle-Degnen, 2009). Numerous examples of assessments and outcome measures may be found in professional journals (see Appendix A) and in core occupational therapy texts (see Appendix B).

Outcome Measures in Hand Therapy. Therapists specializing in hand and upper extremity treatment treat a variety of clients with a range of diagnoses including acute injuries, trauma, post-surgical conditions, work-related musculoskeletal injuries, cumulative trauma, osteoarthritis, rheumatoid arthritis, congenital conditions, and other chronic conditions (ASHT, 2010).

There are similarities in the populations treated by occupational therapists and occupational or physical therapists specializing in hand therapy. While they both might treat a patient with a cerebral vascular accident, based on frames of reference and models employed, the hand therapist would focus on the biomechanical aspects and functions involved in the upper extremity versus the occupational therapist thinking about the broader functional picture including cognition, functional mobility, and living assessments. It is important to consider the need for the occupational therapist to understand the discipline specific assessments used by the hand therapist, and for the hand therapist to consider the needs of the client in a larger context that addresses cognition, emotional well being, function, and participation.

In hand therapy, range of motion (ROM), strength, and sensation were the traditional outcome areas assessed. In the last decade the focus has shifted toward assessing health at the activity level and participation level (Schoneveld, Wittink, & Takken, 2009). Currently there are numerous reliable, valid, and standardized objective assessments available for use in hand therapy settings and in health care, including ROM, edema testing using a variety of measures including figure of eight or a volumeter, manual muscle testing, grip strength testing, typically using a Jamar hand grip dynamometer, sensory testing using the Semmes Weinstein monofilaments or a two-point discrimination instrument, and dexterity assessments such as the Nine Hole Peg Test or the Purdue Pegboard Test (Bear-Lehman, 1997). These assessments are part of the measurable functional evaluation, follow a biomechanical frame of reference and are gathered through observation, touch, or palpation (Bear-Lehman, 1997). Additionally there are five region-specific upper limb tools developed for use in general populations, including the Disabilities of the Arm, Shoulder, and Hand (DASH), the Upper Extremity Functional Scale (UEFS), the Upper Extremity Functional Index (UEFI), the Neck and Upper Limb Index (NULI) and the Upper Limb Functional Index (ULFI) (Gabel, 2006). While these outcome measures are primarily used in the treatment of the upper extremity by hand therapists, occupational therapists in other settings use these measures as well. See Appendix A for a listing of additional measures identified.

Based on the review of the literature there are multiple assessments and outcome measures that therapists can choose to utilize in their practice, as well as a variety of frames of references and outcome measures to guide their choices. The purpose of this study was to determine which measures and approaches therapists used in their practice.

Methodology

Participants

The participants in this study were primarily occupational therapists or physical therapists who were also certified hand therapists, individuals practicing hand therapy, or occupational therapists with an expressed interest in hand therapy. These populations were selected as use of outcomes measures in practice was assumed and because their names and electronic mailing addresses were readily available on their respective websites making them a sample of convenience due to availability of contact information. The subjects were recruited using several methods. The 'locate a certified hand therapist (CHT)' function on the Hand Therapy Certification Commission website was searched for therapists practicing in Minnesota. The ASHT website was also searched for CHTs in Minnesota, and then the lists were cross referenced so duplicate surveys are not sent out. The Minnesota Occupational Therapy Association (MOTA) website was used to find therapists who had an interest in continuing education in hand therapy, and that list was also used and cross referenced to avoid duplicate surveys for the same person. The survey was sent to a total of 154 adults. There were 38 total respondents and 17 of the participants were certified hand therapists.

Design

This study used an electronic survey that was emailed to obtain data as it was able to economically reach a large number of respondents, collect data on numerous variables, and perform statistical manipulation during data analysis that permits multiple uses of the

data set (Rea & Parker, 1997). There are different ways to collect survey data and those include questionnaires or interviews. For this research study a questionnaire was chosen over an interviewer because they have a relatively low cost, the respondent can be anonymous, and interview biases are not a factor. An online method of distribution was chosen over mail, direct, telephone, or face-to-face. The online method was chosen because it is fast, web-based, data can be directly imported for analysis, and features could be incorporated that paper questionnaires could not provide (Forsyth & Frederick, 2006).

Survey content included the assessments and outcomes measures used, the frame of reference applied, and also demographic information about the years of experience as a therapist or as a practitioner specializing in hand and upper extremity therapy, type of setting, and client population. The content of the survey was determined based on a review of the literature on what outcome measures were used in the *Journal of Hand Therapy* in 2008 and 2009 (see Appendix A) and based on the adult rehabilitation assessment and outcome measures found in two commonly used occupational therapy academic texts (see Appendix B), as well as expert opinion. The questions were chosen to best determine the measures hand therapists employ in their practice versus what their professional journals identify as evidence based methods, and what is taught in academic occupational therapy programs. The demographic questions were chosen as a method of best determining the practice setting the methods are used in, therapist years of experience, and if there are trends related to either of those variables. The questions were developed and grouped to minimize the chance of identification through demographic variables.

Procedure

Following survey design, population identification, and creation of a consent form, the research proposal was submitted to the St. Catherine University Institutional Review Board (IRB). These changes were implemented in the study prior to the study being sent to the participants. The method of online survey distribution chosen was to send the subjects a request to complete a survey by electronic mail with a link to the uniform resource locator (URL) for the survey. First, the subjects were sent an electronic message letting them know to expect a survey in one week (see Appendix C and D). The investigators were introduced and the value of the study and the content of the study were made clear. The risks and benefits of the survey were made known, and the time line of when the survey was open was also included. The survey was sent one week later, and included the URL survey access link embedded in the e-mail. The subjects were sent a follow up reminder e-mail and a thank you e-mail upon completion of the survey. The survey was estimated to take approximately ten minutes to complete, and no inducements were offered for participation. The incentive to the participants was the internal knowledge that they were helping the profession through developing more data, research, and interest in hand therapy; which was described in the consent form letter (see Appendix D). The survey was created using Qualtrics survey software (see Appendix E).

Data Analysis

The initial plan of data analysis was to look for relationships between collected data elements, but the relatively low respondent numbers were not conducive to using Chi Square in data analysis. Consequently measures of frequency and central tendency

were used to analyze collected data for trends. Analysis was done using aggregate not individual data.

Results

Demographics

A majority of the 38 respondents were members of a professional organization for therapists, with 79% reporting membership in a state or national organizations, including the American Occupational Therapy Association (AOTA), the American Physical Therapy Association (APTA), the Minnesota Occupational Therapy Association (MOTA), or the Minnesota Chapter American Physical Therapy Association (MN APTA). Additionally, 45% self-identified as certified hand therapists (CHTs) and members of the American Society of Hand Therapists (ASHT). An undetermined number were members of multiple organizations and 8% reported no membership in a therapy related professional organization. The survey showed that 90% of the non CHT respondents were members of AOTA, MOTA, APTA or MNAPTA. Eighty-eight percent of the responding CHTs were members of ASHT, while only 10% of the non CHTs were members of ASHT.

A majority of respondents had completed bachelor's degrees, with 68% reporting a bachelor's degree and 34% a master's degree. Of the 38 therapists responding, several reported more than one degree level completed.

All participating therapists had more than one year of experience, with 21% having between one and five years of experience and 79% having six or more years of therapy experience. The majority of respondents had more than eleven years of experience as a therapist (see Table 1.1).

Description of Practice

Those who responded to the survey reported a typical monthly caseload consisting primarily of clients with acute upper extremity injuries, post-surgical conditions, work-related musculoskeletal injuries, and cumulative trauma. Therapists also reported working with clients who had arthritis, congenital conditions, chronic conditions, pediatric conditions, orthopedic joint replacements, generalized weakness, and lymphedema.

Ninety-two percent of respondents practiced most frequently in outpatient clinics or private practice. The remaining therapists reported working with clients in home health care, schools, inpatient, or long term care settings.

Table 1.1

Years of Practice in Occupational Therapy

| Years of practice | Number of responses n=38 | Percentage |
|-------------------|-----------------------------|------------|
| <1 year | 0 | 0 |
| 1-5 years | 8 | 21 |
| 6-10 years | 4 | 11 |
| 11-15 years | 8 | 21 |
| 16-20 years | 3 | 8 |
| 21-25 years | 5 | 13 |
| 26 or more years | 10 | 26 |

Of 38 survey respondents, 5 did not claim hand and upper extremity therapy as their primary practice area. Nearly one fourth of therapists had between one and five

years of specialized practice (see Table 1.2), and 64% specialized in this area for more than six years.

Table 1.2 *Number of Years Practicing Hand Therapy*

| Years in specialty | Number of responses n=38 | Percentage |
|--------------------|-----------------------------|------------|
| Not applicable | 5 | 13 |
| 1-5 years | 9 | 24 |
| 6-10 years | 5 | 13 |
| 11-15 years | 5 | 13 |
| 16-20 years | 6 | 16 |
| 21-25 years | 4 | 11 |
| 26 or more years | 4 | 11 |

Assessments

Of the over 40 measures reviewed in the survey (see Appendix E), the most consistently reported assessment measures used in practice were active range of motion (AROM) passive range of motion (PROM), grip strength, pinch strength, and the verbal analog pain scale (see Table 1.3).

Table 1.3

Assessments Used to Measure Edema, ROM, Strength, and Pain

| Assessment | Frequently n=38 | Occasionally n=38 |
|--------------------------|--------------------|----------------------|
| AROM | 38 | 0 |
| PROM | 35 | 3 |
| Grip Strength | 37 | 1 |
| Pinch Strength | 36 | 2 |
| Verbal Analog Pain Scale | 32 | 3 |
| Circumferential Measure | 31 | 5 |

Therapists reported frequent use of measures of sensation, dexterity, and coordination (See Table 1.4). The Semmes Weinstein Monofilament test was the most commonly used assessment of sensation, with 78.9% of respondents using this frequently or occasionally. The Nine Hole Peg test of dexterity was the next most frequently or occasionally used assessment. The assessments of motion, strength, and pain displayed in Tables 1.3 were overall used more frequently than those of sensation and dexterity displayed in Tables 1.4. This would indicate that edema, ROM, strength, and pain are used as assessments more frequently than sensation, dexterity, or coordination.

The Disabilities of the Arm, Shoulder, and Hand (DASH or QuickDASH) was the primary assessment of function used most frequently by 45% of respondents. The Patient Rated Wrist/Tennis Elbow Evaluation (PRWE or PRTEE) and Mini-Mental Status exam were also identified, but less frequent use was reported.

Table 1.4.

*Assessments Used to Measure Sensation, Dexterity, and Coordination**

| Assessment | Frequently | Occasionally | Rarely | Do Not Use | Unfamiliar Measure |
|--------------------------------|------------|--------------|--------|------------|--------------------|
| 2 Point Discrimination | 7 | 14 | 13 | 4 | 0 |
| Semmes Weinstein Monofilaments | 14 | 16 | 6 | 1 | 0 |
| Nerve Tension Testing | 13 | 9 | 5 | 7 | 2 |
| 9 Hole Peg Test | 8 | 16 | 11 | 3 | 0 |

*n=38

Outcome Measures

Therapists identified numerous measures as functioning both as assessments and outcome measures used to determine effectiveness of their therapeutic interventions at the end of treatment. Assessments of edema, range of motion, strength, including AROM, PROM, grip strength, and pinch strength (see Table 1.5) were all commonly identified as outcome measures, with the most frequently identified being AROM, followed closely by grip strength, pinch strength, and use of Semmes Weinstein monofilaments. Of the therapists who used the DASH or the QuickDASH, 94% identified that tool as both an assessment and an outcome measure.

Table 1.5

Assessments Used to Determine Successful Treatment at Discharge

| Assessment | Response n=38 | Percentage |
|--------------------------------|------------------|------------|
| AROM | 36 | 94.7 |
| Grip Strength | 35 | 92.1 |
| Pinch Strength | 33 | 86.8 |
| PROM | 28 | 73.7 |
| Circumferential Measure | 27 | 71.1 |
| Verbal Analog Pain Scale | 27 | 71.1 |
| Semmes Weinstein Monofilaments | 25 | 65.8 |
| 9 Hole Peg Test | 20 | 52.6 |
| DASH or <i>QuickDASH</i> | 17 | 44.7 |
| 2 Point Discrimination | 14 | 36.8 |
| Nerve Tension Testing | 13 | 34.2 |
| Sharp-Dull | 7 | 18.4 |
| Mini-Mental Status Exam | 5 | 13.2 |

Goal Setting

Therapists identified multiple approaches to goal setting in their work with clients (see Table 1.7). Two of the strategies most commonly used were based on assessment results, and the most commonly used approach was setting goals intentionally during specific client discussions. The other frequently used strategies were setting goals based on assessment results that were then described to the client, or writing goals based on client comments and in response to written and self report assessments.

Certified hand therapists set goals with their clients during treatment sessions similarly to non-CHTs (see Table 1.8). The CHTs set their goals based on assessment results which are then described to the client 59% of the time compared to non-CHTs, who do this 76% of the time. Setting goals based on client comments and in response to written and self report assessments was reported more often with CHTs than with non-CHTs.

Goals were set during specific client discussions most often with clinicians who were master's educated (84.6%), and least often with bachelor educated clinicians (64.7%) (see Table 1.9). Respondents who identified an associate level degree represented a small sample size, but reported use all three of the primary goal setting strategies (see Table 1.9). Goals were set based on assessment results and were described to the client 76.9% of the time with MA, MS or higher educational degrees, and 61.5% of the time by bachelor educated therapists. Goals were written based on client comments and in response to written and self report assessments 61.5% of the time by therapists with bachelor's degrees, and 46.5% of the time with therapists who have master's degrees or higher.

Table 1.7

Relationship Between Assessment Measures and Goal Setting

| Goal | Response n=38 | Percentage |
|---|------------------|------------|
| Goals are set during specific client discussion. | 30 | 78.9 |
| Goals are set based on assessment results and are described to client. | 26 | 68.4 |
| Goals are written based on client comments and response to written self report assessments. | 24 | 63.2 |
| Goals are set based on predetermined choices available in electronic documentation. | 4 | 10.5 |
| Goals are set based on client orders and number of visits scheduled. | 3 | 7.9 |

Table 1.8

Number of Therapists and Goal Setting in Relation to CHTs vs non CHTs

| Goal | CHT: Total: 17 | Non-CHT: Total: 21 |
|---|----------------|--------------------|
| Goals are set during specific client discussion. | 14 | 16 |
| Goals are set based on assessment results and are described to client. | 10 | 16 |
| Goals are written based on client comments and response to written self report assessments. | 12 | 12 |

Table 1.9

Number of Therapists and Goals Setting in Relation to Current Credentials

| Goal | Associate of Arts or Science: Total: 2 of 38 | Bachelor or Arts or Science: Total: 26 of 38 | Master of Arts or Science or Above: Total: 13 of 38 |
|---|---|---|--|
| Goals are set during specific client discussion. | 2 | 19 | 11 |
| Goals are set based on assessment results and are described to client. | 2 | 16 | 10 |
| Goals are written based on client comments and response to written self report assessments. | 2 | 17 | 6 |

Frames of Reference

The frames of reference and models that practitioners used in their practice are described in Table 2.0. Ninety-two percent of respondents used a biomechanical frame of reference, and 62% reported using a rehabilitative/remediative approach. Compensatory, sensorimotor, and the Model of Human Occupation (MOHO), were also used as models and frames of reference, but much less frequently.

In relation to current credentials, the most frequently used frame of reference was the biomechanical approach (see Table 2.1). The neurodevelopmental approach was used most frequently by practitioners with a Bachelor of Arts or Science degree, but was almost unused by the other two groups of practitioners. The compensatory approach was used similarly across all credential levels. The sensorimotor approach was used by 42% of OTs who have a bachelor of arts or science, but by none of the master's educated OTs.

In relation to the number of years of practice and frame of reference chosen, the biomechanical frame of reference was the most frequently used across the years of practice. The rehabilitative/remediative approach was used in all age groups as well, but somewhat less frequently. The MOHO model was used by newer practitioners, but in people practicing over 21 years it was not used at all. The sensorimotor approach was used by most of the people in the 11 to 15 years of practice group, and was used less frequently in all other age categories. (see Table 2.2).

Table 2.0

Frames of Reference or Client Approaches Used in Practice

| Frame of Reference or Approach | Response n=38 | Percentage |
|-------------------------------------|------------------|------------|
| Biomechanical | 34 | 92 |
| Rehabilitative/Remediative | 23 | 62 |
| Compensatory | 14 | 38 |
| Sensorimotor | 12 | 32 |
| Model of Human Occupation (MOHO) | 11 | 30 |
| Performance (PEOP) | 10 | 27 |
| Neurodevelopmental Treatment | 9 | 24 |
| Cognitive Disabilities | 9 | 24 |
| Occupational Adaptation | 6 | 16 |

Table 2.1

Frame of Reference or Treatment Approach in Relation to Current Credentials

| Frame of Reference or Approach | Associate of Arts or Science: Total: 2 of 38 | Bachelor of Arts or Science: Total: 26 of 38 | Master of Arts or Science or Higher: Total: 12 of 38 |
|--------------------------------|---|---|--|
| Biomechanical | 2 | 24 | 11 |
| PEOP | 0 | 6 | 5 |
| MOHO | 2 | 5 | 6 |
| Neurodevelopmental | 1 | 7 | 1 |
| Rehabilitative/Remediative | 2 | 15 | 6 |
| Compensatory | 1 | 9 | 5 |
| Cognitive Disabilities | 1 | 7 | 1 |
| Sensorimotor | 1 | 11 | 0 |

Table 2.2

Frame of Reference or Model Used in Relation to Years of Practice

| Frame of Reference/Model | 1-5 years | 6-10 years | 11-15 years | 16-20 years | 21-25 years | 26+ years |
|----------------------------|-----------|------------|-------------|-------------|-------------|-----------|
| Biomechanical | 9 | 3 | 5 | 6 | 3 | 4 |
| PEOP | 3 | 2 | 0 | 1 | 1 | 0 |
| MOHO | 4 | 2 | 0 | 2 | 0 | 0 |
| Neurodevelopmental | 2 | 2 | 1 | 2 | 0 | 0 |
| Rehabilitative/Remediative | 6 | 3 | 2 | 6 | 1 | 2 |
| Compensatory | 5 | 1 | 1 | 4 | 0 | 1 |
| Cognitive Disabilities | 2 | 1 | 1 | 3 | 0 | 0 |
| Occupational Adaptation | 1 | 2 | 0 | 2 | 0 | 0 |
| Sensorimotor | 1 | 2 | 4 | 3 | 0 | 1 |

Discussion

Demographics

The results of the survey indicate that certified hand therapists were less likely to be a member of AOTA or MOTA than an occupational therapist working in hand therapy who was not a certified hand therapist. There was a similar number of CHTs who were members of ASHT compared to occupational therapists who were members of AOTA or MOTA. This indicated that the professions are generally equally supported by the practitioners surveyed, but there may be little overlap as members are not as likely to belong to multiple organizations, and information generated in one area may be less accessible to non members. This also reflects the sample of the population as they were accessed through membership lists.

Assessments

Of the assessments listed in the survey, active range of motion was used by 100% of the therapists as an assessment measure, regardless of their practice setting. Approximately half of the therapists surveyed were unfamiliar with 3 of the 41 assessment items, including the Test d'Evaluation des Membres Supérieurs de Personnes Agées (TEMPA), figure 8 edema measurement, and pressure depth edema measurement. Based on the survey, few therapists differentiated between assessments and outcome measures. Frequently used assessment tools were also often identified as outcome measures. From the survey data, 94% of therapists using the DASH or *QuickDASH*

identified it as both an assessment and an outcome measure. Goal attainment and self report on progress was also identified by some respondents as an outcome measure.

Outcome Measures

In reviewing the results of the survey, the outcome measures most commonly used by respondents were biomechanical in nature, and used to evaluate a patient's component part measurements versus their functional ability level. The outcomes chosen were quantifiable with numbers, and a clear improvement could be depicted in reviewing the numbers. Unfortunately, though grip strength can provide a general prediction of overall strength; a range of motion increase of a few degrees, a decrease in an edema measurement, or an improved score on a dexterity measure does not guarantee that the client has gained in functional abilities (Radomski & Latham, 2008). There were approximately 36 therapists who used the DASH or QuickDASH, a self assessment of function, as an outcome measure. This indicated that some therapists used both biomechanical and self assessment of function measures in their practice to measure outcomes.

Goals

Based on the survey results, CHTs set their goals based on client comments and in response to written self report assessments more often than non-CHT occupational therapists. Non-CHT occupational therapists set their goals based on assessment results and goals were described to their clients more often than CHTs. Goals set during client sessions were reported almost equally between CHTs and non-CHT occupational therapists. This indicated that in goal setting, both CHTs and non CHTs used multiple strategies that showed a client centered focus.

The survey indicated that master's educated therapists or higher, were more likely to set goals during specific client discussion and based on assessment results and described to clients, than bachelor's educated therapists. Master's educated or higher therapists were less likely than bachelor's educated therapists to write goals based on client comments and response to written self report assessments.

Overall, the results of the survey indicated that there were three main types of goal setting that OTs and hand therapist's employ in their practice. Two of the strategies most commonly used were based on assessment results, and one of the most consistently used approaches was goals setting with clients. While setting goals intentionally with clients during specific meetings is the most ideal and client centered approach to goal setting, the collected data indicated that there may be factors that prevent this approach from being consistently used. The therapists attempted to set goals based on the information they gathered from the clients or from assessments, but they were not always set during the session. As productivity and efficiency issues in practice continue to be a part of the reality of therapy, the strategies identified may indicate the challenges of client centered goal setting during therapy sessions.

Frames of Reference

In reviewing the frames of reference related to number of years practicing occupational therapy, the biomechanical frame of reference was consistently and most commonly used across all years of practice. Practitioners who had been in practice for 20 years or more were less likely to report using multiple frames of reference than those who had been practicing less than 20 years. The MOHO and PEOP models were used by practitioners who had been working under 20 years, but no one who had been working

over 20 years used these models. The remediative and rehabilitative approaches were used commonly by people who had practiced for 20 years and less, and only infrequently by occupational therapists who had been practicing over 20 years. The sensorimotor approach was unused by master's educated OTs, but was used by nearly half of bachelor's educated OTs. Review of current master's level textbooks for an occupational therapy program found sensorimotor approach information to be generally unavailable.

Recommendations

Educators

Based on the survey results, educators continued clarification of client centered goal setting strategies for their students is important. Attention to differentiation between and presentation of a wide range of assessment and outcome measures should be addressed in academia, as many of the survey responses indicated that practitioners used these concepts interchangeably. Educators have an important academic role that can guide students in learning about frames of references and models, and how they can assist in choosing outcome measures or assessments that are appropriate for their client population and views.

Clinicians

Clinicians reported frequent use of biomechanical measures, but must determine if their clinical impact on function and participation was as carefully measured as their impact on body structures. They can further clarify the difference between assessment tools that are part of the evaluation process versus outcome measures. From the literature reviewed, it can be determined that using reliable and valid outcome measures can help gain reimbursement in practice so practitioners should watch for emerging outcome measure information in multiple professional organizations and related journal sources. As use of models of practice and frames of reference varied with years of practice, to remain up to date on what is going on in the broader of field of occupational therapy in academia, clinical settings, and in research studies, practitioners should take advantage of

ongoing continuing education opportunities that identify changes in professional models, FOR, and concepts as well as specialty practice information.

Based on the survey results it appeared important for hand therapists to continue to research outcome measures and assessments for reliability and validity related to the population being assessed. Personally, this means that I will analyze the frames of reference I am using, and take into account the person as a whole and not break the client down into their components of dysfunction alone. I will look at which assessments are used in my chosen frame of reference and chose my outcome measures based on how they relate to my client's goals. Using evidence based practice will allow me to stay current in what assessments, measures, and treatment options have been proven most effective and relevant.

Further Research

A recommendation for further research is to use this survey with a wider population to increase return rate, and not just hand therapists in Minnesota. The survey could be sent only to CHTs and the data would potentially come out differently, versus surveying hand therapists who were not certified, as well as occupational therapists who have an interest in hand treatment. There also could have been a reminder e-mail sent to participants. Client centered outcome measures for specialized practice areas could also be reviewed and surveyed. Additional exploration of contextual influences on goal setting strategies employed by therapists is also recommended. Goal setting and frames of reference could be further analyzed and reviewed in relation to entry level and veteran occupational therapists.

Limitations

The limitations of this research study included a 24.68% response rate to the survey, which is a low rate of return. The survey was limited to professional organization members of the Minnesota Occupational Therapy Association and the American Society of Hand Therapists, and as a result the information gathered might not be generalized to other states and settings because the survey population was entirely from one state. Additionally, therapist primary practice areas are somewhat varied. The survey items were not comprehensive due to length considerations for the completion of the survey. Additionally, differentiation between assessment, evaluation, and outcome measure should be expanded. Goal attainment as an outcome measure could be further clarified in the survey. Statistically the study is limited as to the data analysis that can be performed as the Chi-Square approximation is inaccurate because the expected frequency is less than five secondary to the low return rate. Additionally, to preserve anonymity demographic data aggregation made it difficult to isolate some specific trends. One demographic question had a minor error allowing therapists to choose more than one response to educational level, which made that data less clearly applicable.

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Appendix A. Review of Adult Assessments in the Journal of Hand Therapy 2008-2009

| Measure | Population in Study | Study Frame of Reference | Article Authors |
|---|---|--------------------------|--|
| Jamar hand grip dynamometer, adapted Patient Specific Functional Scale (PSFS) | 23 subjects with unilateral lateral epicondylitis | Biomechanical | Nourbakhsh, & Fearon, 2008 |
| Survey | 200 Members of ASHT | | Shechtman, & Goodall, 2008 |
| Semmes-Weinstein Monofilaments, VAS, hand-held dynamometer (Rotterdam Intrinsic Hand Mymometer [RIHM]), Sollerman hand function test, manual muscle testing | 45 subjects with various types of Charcot-Marie-Tooth Disease | | Schreuders, Selles, van Ginneken, Janssen, & Stam, 2008 |
| Jamar hand dynamometer, the adapted nine hole peg test, surface EMGs, Naraxon electromyography | 15 subjects; 10 children with spastic hemipelgia cerebral palsy, and 5 age-matched controlled children; all age 8 | Biomechanical | Burtner, Poole, Torres, Manhke Medora, Abeyta, Keene, & Qualls, 2008 |
| Author designed questionnaire | 76 subjects with flexor or extensor tendon injuries. | | Sandford, Barlow, & Lewis, 2008 |
| Interview with guided questions | 9 subjects post carpal tunnel release | | Jerosch-Herold, Mason, & Chojnowski, 2008 |

| Measure | Population in Study | Study Frame of Reference | Article Authors |
|---|--|--------------------------|---|
| VAS, the adapted functional grading scale. | 3 patients, with Type II work related upper limb dysfunction | | Povlsen, & Rose, 2008 |
| A ten-question short answer, open-ended survey | 64 soldiers with metacarpal fractures | | Greer, 2008 |
| Cross sectional randomized survey design, questionnaire | 863 soldiers; 581 subjects with pain, 282 subjects with no reported pain | | Konitzer, Fargo, Brininger, & Lim Reed, 2008 |
| AMA physical impairment testing: 2 point discrimination-two-point discriminator, AROM, Jamar dynamometer, pinch meter gauge, strength, DASH | 61 soldiers with hand injuries | Biomechanical | Chapman, Richard, Hedman, Renz, Wolf, & Holcomb, 2008 |
| MMT, AROM, Monofilament exam, PROM, grip/pinch strength, edema measurements | 3 cases with trauma | Biomechanical | Smurr, Robinson, & Smith-Forbes, 2008 |
| Tape to measure the length of the upper limb, forearm, hand, and middle finger | 34 subjects with no upper limb or cervical spine pathologies | Biomechanical | Echigo, Aoki, Ishiai, Yamaguchi, Nakamura, & Sawada, 2008 |
| DASH, Brigham and Woman's Hospital Carpal Tunnel Symptom Questionnaire. The upper limb tension test (ULTT) | 60 subjects with carpal tunnel syndrome | | Heebner, & Roddey, 2008 |

| Measure | Population in Study | Study Frame of Reference | Article Authors |
|--|--|--------------------------|---|
| Motor Assessment Scale (MAS), Jebsen Taylor Hand Function Test (JTHFT), the Functional Independence Measure (FIM) and the Hand Function Survey (HFS) | 45 people post clinical stroke with residual grip ability | | Blennerhassett, Carey, & Matyas, 2008 |
| Active ROM | 36 subjects with crush injuries metacarpal or phalanx fractures, fracture/lacerations, tendon lacerations, joint injuries, and/or joint contractures | Biomechanical | Schwartz, & Chafetz, 2008 |
| JTHFT, AROM | 33 healthy subjects, right hand dominant | Biomechanical | Bland, Beebe, Hardwick, & Lang, 2008 |
| VAS, AROM, palmar pinch meter, maximal voluntary effort (MVE) | 31 subjects with de Quervain's disease | Biomechanical | Forget, Potte, Arsenault, Harris, & Bourbonnais, 2008 |
| DASH, pre and post splinting assessment | 25 subjects with distal radius fractures | Biomechanical | Lucado, Li, Russell, Papadonikolakis, & Ruch, 2008 |
| ROM, The Numeric Pain Rating Scale (NPRS), volumeter | 5 subjects with subacute or chronic edema post orthopedic injury/surgery | Biomechanical | Priganc, & Ito, 2008 |

| Measure | Population in Study | Study Frame of Reference | Article Authors |
|---|---|--------------------------|--|
| Stages of Stenosing Tenosynovitis (SST), Numeric Pain Rating Scale (NPRS), Jamar dynamometer, modified sphygmomanometer, the number of triggering events in ten active fists, and participant perceived improvement in symptoms | 28 subjects with trigger finger | Biomechanical | Colbourn, Heath, Manary, & Pacific, 2008 |
| Grip and pinch strength, ROM, sequential occupational dexterity assessment (SODA), Michigan Hand Questionnaire (MHQ), DASH | 23 subjects with RA | Biomechanical | Formsma, van der Sluis, & Dijkstra, 2008 |
| QuickDASH and SF-12 | 231 clinical cases and 175 subjects with UEMSD symptoms | | Fan, Smith, Silverstein, 2008. |
| PRWE, SF-36, DASH | 45 subjects with acute distal radius fractures | | Hemelaers, Angst, Drerup, Simmen, & Wood-Dauphinee, 2008 |
| Strength, Coordination | 19 subjects | Biomechanical | Pataky, Latash, & Zatsiorsky, 2008 |

| Measure | Population in Study | Study Frame of Reference | Article Authors |
|--|---|--------------------------|--|
| PEDI, AROM, Volkman's extrinsic finger extensor function, active composite extension (ACE), goniometer, MMT, stereognosis and two-point discrimination, PROM, Task Force on Childhood Motor Disorders, Ashworth scale, Goal Attainment Scaling | 3 subjects with CP | | Wesdock, Kott, & Sharps, 2009 |
| ROM, DASH, VAS | 8 subjects with an ulnar head resection and ulnar head endoprosthesis arthroplasty | | Kaiser, Bodell, & Berger, 2009 |
| ROM | 38 subjects with distal radius fractures, radial head fractures, distal humerus fractures, proximal ulna fractures, wrist tenosynovitis, wrist sprains, both bone fractures, and nonspecified joint contractures. | Biomechanical | McGrath, Ulrich, Bonutti, Marker, Johansen, & Mont, 2009 |
| AUSCAN VA3.1 Osteoarthritis Index, VAS, Jamar grip and pinch dynamometers, Purdue pegboard | 76 subjects with osteoarthritis | Biomechanical | Rogers, & Wilder, 2009 |

| Measure | Population in Study | Study Frame of Reference | Article Authors |
|---|---|--------------------------|--|
| DASH, ROM-digital extension with goniometer | 60 subjects with Dupuytren's contracture in digits II-V | Biomechanical | Engstrand, Borén, & Liedberg, 2009 |
| High resolution ultrasonography | 25 unaffected subjects | Biomechanical | Chen, Tsubota, Aoki, Echigo, & Han, 2009 |
| ROM, skin thickness, VAS, HAMIS (hand mobility in scleroderma test), grip and pinch strength, dexterity from the AHFT (arthritis hand function test), Duruoz Hand Function Index (DHI), Sleroderma functional assessment questionnaire (SFAQ) | 3 subjects with scleroderma | | Mancuso & Poole, 2009 |
| DASH | 1 male subject | | Dewey, Richard, Hedman, Chapman, Quick, Renz, Blackbourne, Wolf, & Holcomb, 2009 |

| Measure | Population in Study | Study Frame of Reference | Article Authors |
|---|---|--------------------------|---|
| CAFÉ 40 physical function questionnaire, posture scores, neural tension scores, strength of arm and hand using Jamar and microfet dynamometers, ROM, stereognosis, localization of point stimuli, graphesthesia, kinesthesia, thumb reaction time test, motor accuracy test, motor control test | 17 adult subjects | | McKenzie, Goldman, Barrango, Shrim, Wong, & Byl, 2009 |
| CA functional evaluation (CAFÉ 40), graphesthesia, BCB stereognosis, grip strength, lumbricals, Tapper test, MMT, posture, digital reaction time test | 15 subjects with focal hand dystonia | | Byl, Archer, & McKenzie, 2009 |
| Hand volumetry | 114 subjects either before or after carpal tunnel release surgery | Biomechanical | Janssen, Schwartz, & Velleman, 2009 |
| DASH, (carpal tunnel questionnaire) CTQ, SF-26v2, pinch strength, SWMF-sensation, ROM, Moberg pick-up test | 29 subjects with hand dysfunction. | | Appleby, Neville-Smith, & Parrott, 2009 |

| Measure | Population in Study | Study Frame of Reference | Article Authors |
|-----------------------------|--------------------------------------|--------------------------|---|
| HAT, DASH, SF12 | 94 subjects with recent hand surgery | | Naidu, Panchik, & Chinchilli, 2009 |
| Goniometer and Pollexograph | 21 subjects with hypoplastic thumb | Biomechanical | de Kraker, Selles, Schreuders, Hovius, & Stam, 2009 |
| ROM, pain scale, MDT | 1 subject with de Quervain's disease | | Kaneko, Takasaki, & May, 2009 |

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Appendix B. Review of Adult Assessments in Two Commonly Used Rehabilitation Texts

| Measure | Population | Primary Frame of Reference | Developed by |
|--|--|-----------------------------|---|
| Action Research Arm Test (ARAT) | Adult | Biomechanical | Carroll, 1965 |
| Actual Amount of Use Test (AAUT) | Adult | | Taub, DeLucas, & Cargo, 1996 |
| Arm Motor Ability Test (AMAT) | Adult | Neurophysiological Approach | Kopp, et al., 1997 |
| The Arthritis Hand Function Test (AHFT) | Adult | | Backman, Mackie, & Harris, 1991 |
| Bennett Hand Tool Dexterity Test (H-TDT) | Adult | Biomechanical | Bennett, n.d. |
| Borg Numerical Pain Scale | Adult | Biomechanical | Borg, 1998 |
| Borg Scale of Rating of Perceived Exertion (RPE) | Adult | Biomechanical | Borg, 1998 |
| Box and Block Test | Norms for children ages 7-9 years, adults, and adults with neuromuscular involvement | Biomechanical | Mathiowetz, Vollard, Kashman, & Weber, n.d. |

| | | | |
|--|-----------------------------------|--|--|
| Canadian Occupational Performance Measure (COPM) | Age 7 years and up | Canadian Model of Occupational Performance | Law et al., 1998 |
| Crawford Small Parts Dexterity Test | Designed for teenagers and adults | Biomechanical | Crawford |
| Dexterity | All ages | Biomechanical | Pooles, 2009 |
| Fine Dexterity Test | Ages 16 and up | Biomechanical | Kohlmeyer, 2003 |
| Fine Motor Task Assessment | School Age | | McHale & Cermak 1992 |
| Figure-of-Eight Technique to measure hand edema | All Ages | Biomechanical | Pellecchia, 2004; Flinn, 2008; Maihafer et al., 2004; Leard et al., 2004 |
| Functional Capacity Evaluation (FCE) | Adults | | King, 2009 |
| Grooved Peg Board Test | All age groups | Biomechanical | Trites |
| Hand volumetry | All Ages | Biomechanical | Dodds et al., 2004; Flinn, 2008 |
| Jebsen-Taylor Hand Function Test | 5 years and up | | Jebsen, Taylor, Trieschmann, Trotter, & Howard |
| Manual Muscle Testing | | Biomechanical | Flinn, 2008; Brandsma et al., 1995; Pollard et al., 2005 |
| McGill Pain Questionnaire | Adults | | |
| Minnesota Rate of Manipulation Test | 13 years and up | Biomechanical | Kohlberg, 2003; Giuffrida, 2009 |

| | | | |
|---|--|---------------|--|
| Motor Activity Log: Amount of Use Scale (AOU) | Adult | | Uswatte, Taub, Morris, Light, & Thompson, 2006 |
| NIH Activity Board | | MOHO | Kielhofner, 2009 |
| Nine Hole Peg test of Fine Motor Coordination | Norms for adults over 20 years | Biomechanical | Mathiowetz, Weber, Kashman, & Vollard, n.d. |
| Occupational Performance History Interview-II (OPHI-II) | | MOHO | Kielhofner, 2009; Kielhofner, et al., 1998; Kielhofner et al., 2001; James, 2009 |
| Occupational Self Assessment (OSA) | | MOHO | Kielhofner, 2009 |
| Preplacement Assessment | Adults | | King, 2009 |
| Purdue Peg Board Test | Norms for adults and children ages 5-15 years, 11 months | Biomechanical | Tiffin, n.d. |
| Range of Motion | All Ages | Biomechanical | Killingsworth, 2006; Kohlmeyer, 2003; Norkin & White, 1995; Poole, 2009; Awan, Smith, & Boon, 2002; Aalto, et al., 2005; Groth et al., 2001; Flinn, 2008 |
| Semmes-Weinstein Monofilament Test | All Ages | Biomechanical | Weinstein, n.d. |

| | | | |
|--|----------|---------------|------------------|
| Test d'Evaluation des Membres superieurs des Personnes Agees (TEMPA) | Adults | | Desrosiers, 1994 |
| Visual Analog Scale for Pain Measurement (VAS) | All Ages | Biomechanical | Flinn, 2008 |
| Work Environment Impact Scale (WEIS) | Adults | MOHO | Kielhofner, 2009 |

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Appendix C: IRB approval

February 23, 2010

Barbara Gilbertson, MS, OTR/L, CHT

Occupational Science and Occupational Therapy Department, #F-25

St. Catherine University

2004 Randolph

St. Paul, MN 55105

Re: IRB#10-N-07 A survey of outcome measures used in occupational therapy/hand therapy and their relation to experience and practice models.

Dear Professor Gilbertson:

Thank you for submitting your research proposal to the St. Catherine University Institutional Review Board (IRB) for review. The primary purpose of the IRB is to safeguard and respect the rights and welfare of human subjects in scientific research. In addition, IRB review serves to promote quality research and to protect the researcher, the advisor, and the university.

On behalf of the IRB, I am responding to your request for exempt level approval to use human subjects in your research. A member of the St. Kate's IRB has read and commented on your application. As a result, the project is approved as exempt. However, the reviewer offered the following suggestions that you may want to consider:

1. In the initial e-mail, indicate why these particular subjects are being contacted.
2. It was also suggested that the researcher introduces him/herself in the first paragraph of the e-mail she sends to participants.

Please note that all research projects are subject to continuing review and approval. You must notify the IRB of any research changes that will affect the risk to your subjects. You should not initiate these changes until you receive written IRB approval. Also, you should report any adverse events to the IRB. Please use the reference number listed above in any contact with the IRB. This approval is effective for one year from this date. If the research will continue beyond one year, you must submit a request for IRB renewal. At the end of the project, please complete a project completion form. These forms are available on the St. Catherine University IRB website.

If you have questions or concerns about these stipulations, please feel free to contact me by phone (X 7739), email (jsschmitt@stkate.edu), or campus mail (mail stop MPLS). We appreciate your work to ensure appropriate treatment of your research subjects. Good luck with your research.

Sincerely,

John Schmitt, PT, PhD

Chair, Institutional Review Board

Appendix D: Recruitment emails 1 and 2

Email 1- Sent to introduce survey

In one week, you will receive an email inviting you to click on a link to a brief survey about assessment measures used by therapists who work with hand and upper extremity clients. The purpose of the survey is to look at trends in selection of measures used in hand and upper extremity therapy treatment, and is part of a master's degree thesis research study conducted by an occupational therapy student from St. Catherine University.

Participation is voluntary and anonymous, and presents minimal to no risk to you as the participant. Data collected does not identify individual participants or worksites, and all responses are automatically grouped to identify general trends. After the survey email link is received, one additional reminder to complete the survey will be automatically sent. Completed surveys are not linked to email addresses, and the researchers will have no way of knowing who has or has not responded to the survey.

The benefit to participation is knowledge that you are helping support research in the profession and that information gathered may help therapists identify current trends in outcome measure used in this specialized field.

Your participation would be greatly appreciated, but the survey allows you to make a decision whether or not to participate, and whether or not to answer all, a few, or none of the questions.

When the email link arrives, your continuation onto, and completion of the survey indicates that you have read this information, your questions have been answered, and you have consented to be part of the population surveyed.

Please contact us at the numbers listed below if you have any questions or concerns regarding the above information.

Thank you in advance for your time.

Sincerely,

Corey L. Bohnen, BS, OTS 651-208-3644
Barbara Gilbertson, MS, OTR/L, CHT 651-690-6953
Assistant Professor and Level I Fieldwork Coordinator

St. Catherine University

Email 1 – sent with survey link

Greetings!

This email provides the link that will take you to the brief survey being conducted by St. Catherine University student Corey Bohnen, OTS, and her advisor Barb Gilbertson, OTR/L, CHT, to look at trends in selection of measures used in hand and upper extremity therapy treatment. This link is being sent to over 150 therapists in Minnesota, and data will be used in as part of a master's degree thesis to be presented in 2011. As indicated in the introductory email you received last week, data collection is voluntary and anonymous, and used to help expand the understanding of methods employed by therapists working in hand and upper extremity rehabilitation.

Your time is greatly appreciated and we thank you. To begin the survey now, please click on this link:

[Note: additional introductory statement is found on page 1 of the full survey, which participant will reach after clicking on the link. That text is found in Appendix F.]

**A Survey of Outcome Measures Used in Hand Therapy
RESEARCH INFORMATION AND CONSENT FORM**

Introduction:

You are invited to participate in a research study investigating outcomes measures, frames of reference, assessment tools, and goal setting practices employed by occupational therapists who specialize in hand and upper extremity treatment in Minnesota. Data assessment will look at description of practice related to influence of experience, credentials, work site, and education on methods selected. Approximately 218 people are expected to participate in this research. This study is being conducted by Corey Bohnen BS, OTS, and Barbara Gilbertson, MS, OTR/L, CHT in the Occupational Science and Occupational Therapy Program at St. Catherine University. You were selected as a possible participant in this research because of your membership in the Hand Therapy Certification Commission, or based on your interest in hand therapy expressed on the Minnesota Occupational Therapy Association website. Please read this form and feel free to call us with questions, our phone numbers are listed below.

Procedures:

If you decide to participate, you will be asked to complete the survey attached to this e-mail. The data will be collected anonymously. This survey will take approximately 15 minutes to complete.

Risks and Benefits:

The study has minimal risks. Care was taken when selecting the survey questions to decrease the amount of personal information requested, and the data collection is blinded to results with minimal identifying information collected.

The benefit to participation is knowledge of helping propel research in the profession. The end results of this survey and thesis paper will help hand therapists identify current trends in outcome measure use in their field of specialty.

Confidentiality:

Any information obtained in connection with this research study that could identify you will be kept confidential. In any written reports or publications, no one will be identified or identifiable and only group data will be presented.

We will keep the research results in a password protected computer in a locked office at St. Catherine University and only my advisor and I will have access to the records while we work on this project. We will finish analyzing the data by winter of 2011. The data identifying subjects will not be linked to survey results.

Voluntary nature of the study:

Participation in this research study is voluntary. Your decision whether or not to participate will not affect your future relations with St. Catherine University in any way. If you decide to participate, you are free to stop at any time without affecting these relationships, and no further data will be collected.

New information:

If during course of this research study we learn about new findings that might influence your willingness to continue participating in the study, we will inform you of these findings.

Contacts and questions:

If you have any questions, please feel free to contact me, Corey, (or my advisor Barbara Gilbertson at 651-6906953) at 651-208-3644. If you have any questions, we will be happy to answer them. If you have other questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you may also contact John Schmitt, PhD, Chair of the College of St. Catherine Institutional Review Board, at (651) 690-7739.

You may keep a copy of this form for your records.

Statement of Consent:

You are making a decision whether or not to participate. Your continuation onto, and completion of the survey indicates that you have read this information and your questions have been answered.

Thank you for taking the time to read this consent and take part in the survey. Your participation is very much appreciated, and will help my thesis paper incredibly.

Corey Bohnen, BS, OTS

Telephone Script

Hello,

My name is Corey Bohnen, and I am an occupational therapy student at St. Catherine University. I am working with my advisor Barb Gilbertson on a survey about hand and upper extremity assessment measures as part of my master's thesis. We have designed a brief survey that will be emailed to over 150 Minnesota therapists in March of this year. I would like to include as many individuals as possible in my data collection. If you are willing to participate, I would like to ask for your email address so that a survey link can be sent to you. Please note that all data collected is anonymous. I will not know if you choose to take or not take the survey once you receive the email link.

(If in person) Would you be willing to share your email address with me?

(If yes) Thank you very much. (Record email address, repeat back to ensure clarity of record). Are there other therapists at this site who might want to be included in this survey? (If yes, record additional addresses). The initial survey mailing will occur on March 1st. Do you have any questions?
Thank you.

OR

(If recording and message is left) If you are interested in participating in this survey, please leave a message, with your email address clearly spelled out, for occupational therapy student Corey Bohnen, at 651-208-3644.

OR

(If no) Thank you for your time, as I do not have your email address, you can be assured you will not receive a survey.

Appendix E: Survey Introduction and Full Survey

Welcome to the hand and upper extremity survey of assessment measures. The survey should take 15-20 minutes to complete. Completion of all questions is encouraged but not required. The survey will be open from March 1st to March 31st, 2010. If you are interrupted during completion, you may return to the survey at a later time. All responses are collected anonymously.

Clicking on the arrow at the bottom of this page will bring you to the first question. Continuing with the survey indicates your consent to have your answers used as part of the data compiled from this project.

If you have any questions, please contact occupational therapy thesis student Corey Bohnen at 651-208-3644 or her advisor Barb Gilbertson at 651-690-6953 at the St. Catherine University OSOT Program.

Again, we sincerely thank you for your time!

Hand Therapy Outcome Measure Survey

1. In your practice, which of the following assessments do you use to measure edema, ROM, endurance, strength, and pain. For step 1, indicate the frequency of use of each assessment. For step 2, check only if you use this assessment to determine successful treatment at time of discharge.

Step 1: Frequency of Assessment Use

For purposes of the survey note that:

Frequently: Daily to Weekly

Occasionally: Weekly to Monthly

Rarely: Quarterly to Annually

Step 2: Check yes in final box on right if you routinely use this assessment to identify successful treatment at time of discharge

| Assessment | Frequently Use | Occasionally Use | Rarely Use | Do Not Use | Unfamiliar Measure | Yes |
|--|----------------|------------------|------------|------------|--------------------|-----|
| Volumetric Edema Measure | | | | | | |
| Circumferential Edema Measure | | | | | | |
| Figure 8 Measure | | | | | | |
| Pressure Depth | | | | | | |
| AROM | | | | | | |
| PROM | | | | | | |
| Torque Force ROM | | | | | | |
| Grip Strength | | | | | | |
| Pinch Strength | | | | | | |
| BTE Strength Test | | | | | | |
| Timed or recorded repetitions to measure endurance | | | | | | |
| Client self report of endurance | | | | | | |
| Borg Scale | | | | | | |
| 6 Minute Walk Test | | | | | | |
| Visual Analog Pain Scale | | | | | | |
| Verbal Analog Pain Scale | | | | | | |
| McGill Pain Scale | | | | | | |
| Wong - Baker Faces Pain Scale | | | | | | |

2. In your practice, which of the following assessments do you use to measure sensation, dexterity, coordination or hand function. For step 1, indicate the frequency of use of each assessment. For step 2, check only if you use this assessment to determine successful treatment at time of discharge.

Step 1: Frequency of Assessment Use

For purposes of the survey note that:

Frequently: Daily to Weekly

Occasionally: Weekly to Monthly

Rarely: Quarterly to Annually

Step 2: Check yes in final box on right if you routinely use this assessment to identify successful treatment at time of discharge

| Assessment | Frequently Use | Occasionally Use | Rarely Use | Do Not Use | Unfamiliar Measure | Yes |
|----------------------------------|----------------|------------------|------------|------------|--------------------|-----|
| 2 point discrimination | | | | | | |
| Sharp - dull | | | | | | |
| Semmes Weinstein Monofilaments | | | | | | |
| WEST Monofilament Test | | | | | | |
| Nerve Tension Testing | | | | | | |
| 9 Hole Peg Test | | | | | | |
| Jebsen-Taylor Hand Function Test | | | | | | |
| Purdue Pegboard Test | | | | | | |
| Tempa | | | | | | |
| Bennett Hand Tool Dexterity Test | | | | | | |
| Minnesota Rate of Manipulation | | | | | | |
| Functional Dexterity Test | | | | | | |
| Valpar tests | | | | | | |

3. In your practice, which of the following assessments do you use to measure function, cognition, or mental status. For step 1, indicate the frequency of use of each assessment. For step 2, check only if you use this assessment to determine successful treatment at time of discharge.

| Step 1: Frequency of Assessment Use For purposes of the survey note that: Frequently: Daily to Weekly Occasionally: Weekly to Monthly Rarely: Quarterly to Annually | | Step 2: Check yes in final box on right if you routinely use this assessment to identify successful treatment at time of discharge | | | | |
|---|-------------------|---|---------------|------------------|-----------------------|-----|
| Assessment | Frequently Use | Occasionally Use | Rarely Use | Do Not Use | Unfamiliar Measure | Yes |
| Disabilities of the Arm, Shoulder and Hand (DASH or Quick DASH) | | | | | | |
| Upper Limb Functional Index (ULFI) | | | | | | |
| Patient Rated Wrist/Tennis Elbow Evaluation (PRWE or PRTEE) | | | | | | |
| Short Form-12 or Short Form-36 | | | | | | |
| Mini-Mental Status | | | | | | |
| Generalized Anxiety Scale | | | | | | |
| Beck Depression Inventory | | | | | | |
| Canadian Occupational Performance Measure (COPM) | | | | | | |
| Disabilities of the Arm, Shoulder and Hand (DASH or Quick DASH) | | | | | | |
| Upper Limb Functional Index (ULFI) | | | | | | |
| Short Form-12 or Short Form-36 | | | | | | |
| Mini-Mental Status | | | | | | |

4. Are there any other assessments not listed in the prior questions that you routinely use in practice to successfully measure the result of treatment? If so, please identify in the space below.
5. Select the statements that best describe the relation between assessment measures and goal setting in your clinic. (Please select all that apply)
 - Goals are set during specific client discussion.
 - Goals are set based on assessment results and are described to client.
 - Goals are written based on client comments and response to written self report assessments.
 - Goals are set based on client orders and number of visits scheduled.
 - Goals are set based on predetermined choices available in electronic documentation.
 - Other
6. Which frames of reference or client approaches do you use in practice? (Please select all that apply)
 - Biomechanical
 - Person-Environment-Occupation-Performance (PEOP)
 - Model of Human Occupation (MOHO)
 - Neurodevelopmental Treatment
 - Rehabilitative/Remediative
 - Compensatory
 - Cognitive Disabilities
 - Occupational Adaption
 - Sensorimotor
 - Other
7. Please estimate your typical monthly client caseload (total should equal 100%).
 - Acute injuries/ trauma/ post-surgical
 - Work-related musculoskeletal injuries/cumulative trauma
 - Osteoarthritis/rheumatoid arthritis
 - Congenital conditions
 - Chronic conditions (CVA, TBI, MS)
 - Other
8. How many years have you been practicing as an occupational therapist?
 - Less than 1 year
 - 1-5 years
 - 6-10 years
 - 11-15 years
 - 16-20 years
 - 21-25 years
 - 26 or more years
9. If hand and upper extremity evaluation and treatment is your primary practice area (over 50% of your caseload), please indicate approximately how long this has been your specialty.

- Not applicable
 - Less than 1 year
 - 1-5 years
 - 6-10 years
 - 11-15 years
 - 16-20 years
 - 21-25 years
 - 26 or more years
10. What is your current practice setting? (Please select all that apply)
- Inpatient or long term care
 - Outpatient or private practice
 - Other
11. Which professional organizations are you a member of? (Please select all that apply)
- American Society of Hand Therapists (ASHT)
 - American Occupational Therapy Association (AOTA)
 - Minnesota Occupational Therapy Association (MOTA) or American Physical Therapy Association (APTA)
 - Minnesota Chapter American Physical Therapy Association (MN APTA)
 - None
 - Other
 - Prefer not to answer
12. Are you a certified hand therapist?
- Yes
 - No
13. What are your current credentials? (Please check all that apply)
- Associate of Arts
 - Bachelor of Arts or Science
 - Master of Arts or Science or above
 - Other