

## Completed Theses and Research Projects 2013



Title: **Examining the Use of the Shore Handwriting Screening to Assess the Handwriting Skills of Pre-Kindergartners**

Researcher(s): **Erin Schofield; Under the direction of Dr. Denise Donica**

Purpose: The purpose of this study was to examine the use of the Shore Handwriting Screening (Shore; Shore, 2003) along with a Shore Score Sheet that has been created by researchers at East Carolina University to assess the handwriting skills of pre-kindergartners. The researchers also compared students' scores across two socioeconomic (SES) groups.

Method: Pre-kindergarten students' scores on the Shore were compared to their scores on a portion of a standardized fine motor assessment, the Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2; Bruininks & Bruininks, 2005). Fourteen students from a private pre-kindergarten classroom and 36 students

from a pre-kindergarten Head Start classroom completed the Shore and BOT-2 and scores were compared within and across the two classrooms.

Results: Across both groups, the Shore displays moderate to strong correlations with three subtests of the BOT-2. Students from the private pre-kindergarten classroom obtained significantly higher scores on the Shore and on several subtests of the BOT-2 in comparison to the Head Start classrooms.

Conclusion: The Shore is a functional handwriting screening that shows correlations with the BOT-2, providing support of its ability to measure students' handwriting skills. Students from a higher SES also obtained higher scores on the Shore and the BOT-2, supporting previous research.



Title: **Implementing the Alert Program® for Self-Regulation through the Response to Intervention Model with Selected At Risk Children: Collaborating with Elementary Education Teachers to Identify Effective Strategies for Improving Students' Readiness to Learn**

Researcher(s): **Monica Powell; Under the direction of Dr. Carol Lust**

Purpose: The purpose of this study was to determine whether participation in the Alert Program as kindergartners produced lasting effects for first and second graders in either 1) the current functioning status of the students, or 2) in the ability of students previously identified with challenges in the kindergarten year to respond to additional intervention.

Method: This follow-up study utilized a pre-test/post-test design. First and Second grade teachers completed the Sensory Processing Measure (SPM) and School Function Assessment (SFA). An eight week intervention of The Alert Program for Self-Regulation was implemented with children that were identified as at risk on the pre-test instruments. The teachers completed the SPM and SFA a second time following the treatment.

Results: Data indicate that Alert Program intervention in Kindergarten had a sustained impact in first and second grade with some problems or definite difficulties in the SPM. For example 10/14 kindergarten students were scored as having some or definite sensory difficulties before intervention. In the same cohort in 2nd grade only 2/11 students met the same criteria in total score. Similar patterns also were seen in hearing, touch and balance subcategories of the SPM.

Conclusion: Results show that the Alert Program for Self-Regulation is a beneficial intervention in the classroom. Further, results revealed that it is important for the classroom teachers to fully embrace the need and potential benefits of the Alert Program® for Self-Regulation to see the best results.



**Title: A Case Study of Occupational Therapists Serving Military Personnel: Identifying Therapeutic Approaches to be Considered When Assessing the Occupational Performance of Military Service Members**

**Researcher(s): Kelly Pippin; Under the direction of Dr. Leonard Trujillo**

**Purpose:** The purpose of this study was to identify the means by which occupational therapists working with military service members (MSMs) assess the occupational performance of such populations given the uniqueness of military culture.

**Method:** Data was collected through face-to-face and phone interviews with four occupational therapists who have experience working with MSMs as a primary client base. Written follow up questionnaires were used to gather additional information as needed. Interviews were recorded and transcribed using LiveScribe.

**Findings:** There is a general consensus among participants that assessments currently available can be to address occupational performance of MSMs; however, the approach used to carry out such assessments must address the uniqueness of military culture in order to achieve the greatest effectiveness and sensitivity.

**Conclusion:** While it is understood that occupational therapists should be client-centered and culturally sensitive, the extent to which cultural differences should be attended to may be greater when assessing occupational performance of MSMs because of the magnitude of unique cultural aspects.



**Title: The Use of the Classroom Techniques & Tools Intervention System (CATT) in a Rural Elementary School**

**Researcher(s): Brittany Robertson; Under the direction of Dr. Denise Donica**

**Purpose:** The purpose of this study was to examine the use of the CATT Intervention System in an elementary school in rural eastern North Carolina and to collect case study data on overall effectiveness of the system.

**Method:** A survey will be administered in May to all teachers to determine ease of use of the system 7 months after implementation and training. In addition, data on student learning barriers was collected through an online screener at three points during the school year. A single case study was selected to demonstrate how the CATT Intervention System was used to help a student.

**Results:** The survey data has not been administered to date. The case study is currently ongoing, but it is promising to show that use of the CATT Intervention System assisted the student in improving his performance within the classroom.

**Conclusion:** The results from this study will inform future users of the benefits and challenges of incorporating the new CATT system into a rural elementary school. This data will provide information in regards to elements of the system that worked well and those elements to be considered for review in order to best implement this system in the future.



**Title: The Effectiveness of Matter of Balance® in Reducing Activity Restriction, Anxiety, and Depression in Older Adults**

**Researchers: Lindsey Straub & Meredith Burke; Under the direction of Dr. Jane Painter**

**Purpose:** This quasi-experimental study focused on whether a Matter of Balance® evidence-based fall prevention program was able to reduce an older adult's activity restriction, anxiety, and depression.

**Method:** Pre- and post-tests (COPM, FROP-COM, SAFFE, GDS-SF, and GAD-7) were administered to 11 older adults ranging in age from 78 to 96 years old at Cypress Glen Continuing Care Retirement

Community, Greenville, NC. The participants were enrolled in Matter of Balance® program for 4 weeks, 2 times a week for 2 hour classes.

**Results:** Increases were seen in activity level, perception of functional performance, and perception of functional satisfaction. Decreases were observed in depression, anxiety, and activity restriction. Fear of falling increased from pretest to posttest, which is likely a result of increased level of fear of falling awareness by participants.

Conclusion: Matter of Balance® is an effective program to help older adults reduce activity restriction, anxiety, and depression. However, further research should be done to determine the lasting effects of the program and with a larger sample size.



**Title: Effectiveness of a Therapeutic Hand Skills Camp on Handwriting Skills**

**Researchers: Brittany Woerner, OTS; Winnie Miller, COTA/L; Under the guidance of Denise Donica, DHS, OTR/L, BCP**

**Objective:** This study measured handwriting improvement found in 10 participants of a short duration high intensity hand skills camp offered to pre-k and elementary students.

**Method:** The study used a pre-test/post-test design to compare results of three separate writing groups (Pre-K: Capital Letters, Manuscript Writing, and Cursive Writing). The Check Readiness was used to

measure the Capital Group. The ETCH and Screener of Handwriting Proficiency were used to measure the Manuscript and Cursive Groups. Each group received 1 hour of handwriting instruction 2 times a week for a 4 week duration.

**Results:** All 6 participants made individual improvements on the Check Readiness. Three of the four participants made progress on the Screener of Handwriting Proficiency. When comparing pre-test and post-test, each participant in the cursive group made improvements on all 3 subtests of the ETCH. The participant in the Manuscript group made improvements on 2 subtests (Word and Letter Legibility) on the ETCH.

**Conclusion:** Children who participated in the hand skills camp had improved skills at the conclusion of the camp. This study supports the need for further research to determine effectiveness of the program. However, this is a first step in exploring the potential benefits of focused camps for students struggling with handwriting.



**Title: An Examination of Sensory Assessment Data to Determine Incidence of Sensory Difficulties and Need for Alert Program® Implementation Within Kindergarten Classrooms**

**Researchers: Ame Wickham & Meaghan Johnson; Under the direction of Dr. Carol Lust**

**Purpose:** The purpose of this study was to analyze sensory pretests to determine the incidence and prevalence of sensory dysfunction in kindergarten students. This would allow researchers to determine if the Alert Program® would be beneficial to implement within a regular education kindergarten classroom.

**Method:** Data was collected over 3 years through standardized assessments. The Sensory Processing Measure (SPM) School Form and Part III (Activity Performance) of the School Function Assessment (SFA) were both completed by the classroom instructor. The participants were kindergarten students in regular education classrooms.

**Results:** Based on the analysis of the data we found that 28.08% of kindergartners are below the criterion score for Part III of the SFA and 25.86% of kindergartners are below the criterion score for the SPM.

**Conclusion:** These percentages suggest that there is a need for sensory self-regulation programs in kindergarten classrooms. It can be assumed that the Alert Program® would be beneficial to implement within regular education classrooms.



**Title: What NC therapists Know About the Health Conditions of Farmers: Results from the NC AgrAbility Health Professionals Survey**

**Researcher(s): Sarah Timmons & Farrell Wiggins; Under the direction of Dr. Mary Hildebrand**

**Purpose:** Our research contributes to the North Carolina AgrAbility Project by discovering what health professionals know about the health conditions of farmers. With this information, continuing education courses will be developed to prepare them to care for farmers in our state.

**Method:** Survey research using Qualtrics Survey Software was completed through email of health

professional state organizations. For the purposes of this research, we focus only on the occupational therapy survey participants contacted through the North Carolina Occupational Therapy Association (NCOTA; N=114). Data was analyzed with SPSS v.19.

**Results:** NCOTA members reported that 78% had no previous agricultural training, 80% were unsure about helping farmers locate services, 75% believed that occupational therapy students should study

the agricultural population, and 54% expressed interest in attending continuing education about working with farmers.

Conclusion: Occupational therapists are aware of the limited knowledge they have of working with farmers and are interested in continuing education opportunities for learning more about this unique population.



**Title: A systematic review of the effectiveness of the Interactive Metronome™ as a treatment intervention for the growing number of mild traumatic brain injuries resulting from Operation Enduring Freedom and Operation Iraqi Freedom**

**Researcher(s): Alana Justice and Stacia Pomeroy; Under the direction of Dr. Trujillo**

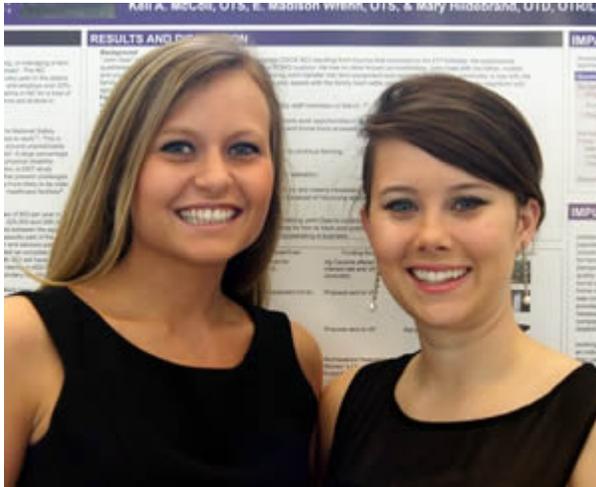
**Purpose:** The purpose of this study was to compile and synthesize literature necessary to support the need for Interactive Metronome as an evidence-based intervention system, to treat the continually rising number of mild traumatic brain injuries presenting in military personnel returning from the wars in Afghanistan and Iraq as well as to gather

support for the use of fNIR systems to measure the effectiveness of Interactive Metronome on brain activity.

**Method:** Data was collected through a thorough search of literature in the areas of mild traumatic brain injury, interactive metronome, gaming systems, neuroplasticity, and optical imaging.

**Results:** Data shows there is a continually increasing number of mild traumatic brain injuries occurring each year as a result Operation Enduring Freedom and Operation Iraqi Freedom. Additionally, there limited current evidence-based treatment for this condition. The Interactive Metronome has been found to improve many of the symptoms seen in individuals with mTBI, however, more research must be conducted. These initial results may suggest that the IM would be a valid intervention for individuals with mTBI.

**Conclusion:** These results encourage the development of a new and reliable treatment for individuals with mTBI. Additionally, the future studies should utilize the optical imaging systems to study the effectiveness of the Interactive Metronome by measuring brain activation during treatment.



**Title: North Carolina AgrAbility Project: Assistive Technology Recommendations for Farmers with Spinal Cord Injuries (SCI)**

**Researcher(s): Keli McColl & E. Madison Wrenn; Under the direction of Dr. Mary Hildebrand**

**Purpose:** This case study documents the services of the North Carolina AgrAbility Program (NCAP) for a farmer with a C5-C6 SCI. We discuss assistive technology recommendations and determine additional services that occupational therapists may provide to help this farmer gain independence in farming tasks.

**Method:** Data was collected through an on-site assessment with the farmer who has mobility impairment due to his SCI. The participant was selected based on his unique agricultural needs and the impact of his injury on his ability to farm.

**Results:** After analyzing the farming assessment, recommendations were made including home modifications, assistive technology, and education on preventing secondary injuries.

**Conclusion:** This case study will serve as a resource for occupational therapists in determining the specific needs of farmers with SCI and in providing assistive technology solutions to eliminate the barriers to farming caused by a mobility impairment.



**Title: A Comparison of Brake Reaction Times Across the Lifespan**

**Researchers: Stacey Burhans & Katie Apple; Under the direction of Dr. Anne Dickerson**

**Purpose:** Establish brake reaction time norms for the Simple (Foot) Brake Reaction Timer across ages as well as comparing it to alternative reaction timers, including a choice (foot) reaction timer, a simple (hand) reaction timer, and a handheld reaction timer.

**Method:** Data was collected on over 250 older adults on the Simple (Foot) Brake Reaction Timer using standardized protocols. Sixty participants were also tested on each alternative reaction timers [e.g., a choice (foot) reaction timer, simple (hand) reaction timer, and a handheld reaction timer]. All participants were active drivers, self-reported healthy, and included 16 under 40 years of age, 13 between 40-64 years, and 31 over 65 years of age.

**Results:** An ANOVA of the simple (foot) brake reaction timer was a significant difference ( $F=9.31$ ,  $p<.001$ ) between age groups. Post-hoc tests indicated the differences were between individuals over 60 years of age with all other age groups, except for individuals 19 and younger, who were only different from individuals over 70. Using paired t-tests, differences in reaction times was demonstrated with the choice ( $p<.001$ ) and handheld ( $p<.001$ ) using the left and right hands. In comparison age groups

performance with the different timers, the choice timer demonstrated the only difference ( $F=3.93, p<.03$ ) which was between the older adults and the two other age groups.

Summary: Results suggest the simple (foot) brake reaction timer demonstrates an appropriate slowing of reaction speed with age. Accordingly, the choice (foot) brake reaction increase in time was exaggerated with older adults. Results also suggest that the simple (hand) brake reaction timer can be used to replace a foot reaction, however the handheld may be a more complicated process.



**Title: The Impact of Handwriting Without Tears in Kindergarten on the Handwriting Performance of Incoming First Grade Students**

**Researchers: Caitlin Zawistowicz & Kristen Gibbs; Under the direction of Dr. Denise Donica**

**Purpose:** The purpose of this study was to determine if receiving the Handwriting Without Tears (HWT) curriculum in kindergarten helped prepare incoming first grade students to have superior handwriting legibility.

**Method:** Students in the experimental group ( $n=31$ ) used HWT in kindergarten while students in the control group ( $n=26$ ) received informal handwriting instruction using the D'Nealian manuscript style. Students completed the Test of Handwriting Skills-Revised (THS-R) during the first month of first grade. The scaled scores of the two groups were compared using an independent groups t-test.

**Results:** The control group received a sum scaled score total of 96.46 and the experimental group received a sum scaled score total of 111.87 ( $p=.001$ ). With 6 of the 10 THS-R subtests, the experimental group had significantly higher scores than the control ( $p <.05$ ), while the experimental group outscored the control on all 10 subtests.

**Conclusion:** Incoming first grade students who received HWT in kindergarten scored above the median on all of the subtests of the THS-R and had a significantly higher score than the control on all subtests with lowercase letters thus supporting that those who received HWT instruction in kindergarten had better handwriting legibility entering first grade than those without.



**Title: North Carolina AgrAbility: Cultivating Accessible Agriculture for Farmers with Respiratory Conditions**

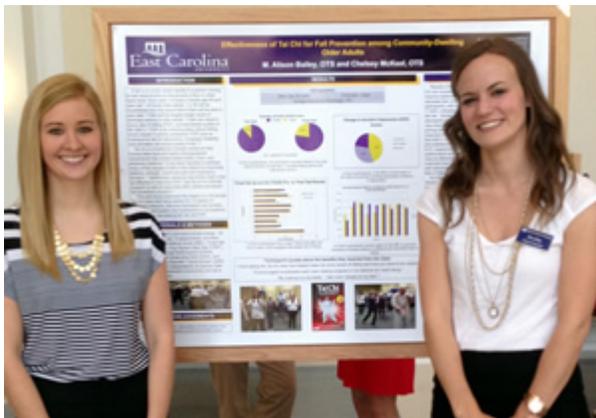
**Researchers: Katie Hopkins & Laura Klein; Under the direction of Dr. Mary Hildebrand**

**Purpose:** This case study documents the services of the North Carolina AgrAbility Partnership for a farmer with respiratory disease and osteoarthritis. We discuss assistive technology recommendations and work modification that occupational therapists can provide to allow this farmer to continue his lifelong passion of farming.

**Method:** This participant was chosen based on his unique medical and agricultural needs and their impact on his ability to continue to farm. Data was collected through interview and an on-site farm assessment.

**Results:** It was determined this farmer would benefit from multiple power filtering air respirators to prevent further insult to his respiratory system. Local organization and grant funding resources were explored to help the farmer purchase the respirators. Occupational therapy interventions to maintain independence in farming also included recommending assistive technology and modified work practices for respiratory disease and osteoarthritis.

**Conclusion:** This case study highlights the unique needs of farmers with respiratory disease and osteoarthritis and will serve as a model for occupational therapists to provide services to farmers with these conditions.



**Title: Effectiveness of Tai Chi for Fall Prevention among Community-Dwelling Older Adults**

**Researcher(s): Chelsey McKeel & M. Alison Bailey; Under the direction of Dr. Jane Painter**

**Purpose:** This study examined the effectiveness of a 12-week Tai chi for Arthritis class on balance, participation in ADLs, fear of falling, depression, anxiety, and the number of falls in older adults living in a retirement community.

**Method:** This pilot study utilized a pre-test/post-test design. Nine independently living older adults were given 6 assessments: Activities-specific Balance Confidence Scale, Timed Get Up and Go, Four Square Step Test, Canadian Occupational Performance (COPM), Geriatric Depression Scale short form, and Generalized Anxiety Disorder 7 Quick Screen.

**Results:** Results indicated participation in Tai chi may increase occupational performance and satisfaction, improve balance, and decrease depression, anxiety, and fear of falling. COPM results reflected increased occupational performance and satisfaction. Due to the small sample size, statistical significance could not be determined for any outcome measure. However, the observed positive

findings support our hypothesis that Tai chi aids in improving occupational performance and satisfaction, improving balance, and decreasing depression, anxiety and fear of falling among community-dwelling older adults; thereby reducing fall risk.

Conclusion: Further research with generally healthy older adults and the effectiveness of Tai chi in fall prevention is needed. However, it is recommended that Tai chi be used as a group intervention by OTs working with older adults to decrease falls, improve occupational performance and satisfaction, improve balance, decrease depression and anxiety, and decrease fear of falling.



Title: **Evaluating the Use of an Interactive Driving Simulator from the Perspective of Occupational Therapy Practitioners and Older Adults**

Researchers: **Christopher Wetherington & Alexander Schwarga; Under the Direction of Dr. Anne Dickerson**

Purpose: Explore the face validity of an interactive driving simulator OT Drive as an appropriate assessment and/or intervention tool from the perspective of occupational therapy students, practitioners, and older adults.

Method: The OT Drive is new software that uses interactive driving simulation with designed scenarios. Initially, 20 occupational therapy students evaluated the system from the perspective of a client and therapists. With their feedback, specific questions and procedures were designed for the therapists and older adults. Next 5 experienced occupational therapists evaluated the system from the perspective of a practicing therapist in a medical center. Finally, 31 older adults evaluated the system from the perspective of a possible user of the system. All participants observed or participated on the simulator prior to answering the questions. Feedback was gathered by use of seven 10-point Likert scale questions and exploratory questions. Descriptive statistics are used as well as analysis of qualitative data.

Results: The occupational therapists indicated OT Drive would be a useful tool, both as an assessment tool and intervention strategy. Feedback from the older adults was mixed. Most felt that the driving simulator is not the same as a motor vehicle (Mean = 5.29). However, most indicated that it would be acceptable and realistic to be able to use to identify driving risk for someone with a significant medical condition that affects driving (Mean = 8.14) and the feedback information accurately reported performance (Mean = 8.04).

Conclusion: The OT Drive appears to have excellent face validity with occupational therapists and good to excellent face validity with older adults, depending on the use and condition tested.