

Completed Theses and Projects 2021

Theses:



Maintaining Social Participation and Quality of Life Through Community Mobility After Driving Cessation With Transportation Planning

Researcher: Kathryn Moore under the direction of Dr. Lynne Murphy

Purpose: To explore potential best practices in transportation planning and the influence of transportation planning on social participation, quality life, and community mobility among older adults who are facing driving retirement

Method: This descriptive case series investigated methods for implementing transportation plans and identifying related barriers, along with facilitatory and inhibitory factors associated with community

mobility for three older adults who received the recommendation to cease driving. Data was collected during transportation planning sessions and through pre and post assessments regarding social participation, quality of life, and community mobility. Participants engaged in three intervention sessions to create and implement an individualized transportation plan based on their habits, needs, and supports.

Results: Overall, minimal change was noted on the pre and post assessments measuring social participation, quality of life, and community mobility. Strategies for implementing transportation planning include considering differences among participants and conducting sessions in person. Barriers to implementing transportation plans include negative attitudes and emotions, limited transportation alternatives, decreased insight to deficits, and distractions from the transportation planning process. Factors that facilitate community mobility included access to a large support network and receiving rides from friends and family. Inhibitory factors for community mobility included reluctance to ask others, living in rural areas, and impaired physical mobility.

Discussion: Meaningful trends and perspectives of older adults were identified as they transitioned to a stage in their life in which they are no longer driving. Influential factors on transportation planning appear to be highly individualized. Further research is indicated to more closely examine the relationship between transportation planning and social participation, quality of life, and community mobility.



Inpatient Rehabilitation Services and Physical Activity Level

Researcher: Carley Overman under the direction of Dr. Young Kim

Purpose: The objectives of this study were to determine the difference in physical activity level between occupational therapy, physical therapy, and speech-language pathology services, the difference in physical activity level between the time of receiving rehabilitation services and the time not receiving rehabilitation services, and the difference in physical activity level between the days receiving rehabilitation services and the days not receiving rehabilitation services in patients in inpatient rehabilitation.

Method: Thirty-eight participants were recruited from Vidant Medical Center's inpatient rehabilitation facility for this prospective observational study. Participants were screened for moderate-to-severe cognitive impairments and wore an activity tracker to monitor physical activity for a duration of up to two weeks.

Results: Significant differences were found in total activity counts between occupational therapy, physical therapy, and speech-language pathology services and in pairwise comparisons. Occupational therapy had the highest total activity counts among all therapies. A significant difference was found between times that participants were in therapy versus times that participants were not in therapy. A significant difference was found between days in which participants received therapy versus days in which participants did not receive therapy.

Discussion: Significant physical activity differences among types of therapy could be attributed to the variations in therapy activities across therapy types, timing of therapy sessions, and/or level of patient impairment. Movement that is required to participate in inpatient rehabilitation such as bed and functional mobility and therapy activities contribute to the increased physical activity during the times that participants are participating in therapy. Non-therapy days most often occur on a weekend day, which is less structured than weekdays that require three hours of therapy. The increase in physical activity seen with therapy highlights a necessity of providing the patients with generalizability of therapy interventions, adaptations of therapy interventions, or individualized programs that can be implemented during non-rehabilitation times and post-discharge without a therapist present.



Visual Reaction Time Differences Between Medically-at-Risk Adult Drivers and Healthy Controls

Researcher: Victoria Penna under the direction of Dr. Anne Dickerson

Purpose: The purpose was to examine visual processing speed using the Vision Coach™, a visual light board with established normative data for community living adults. Specifically, this research study compared visual reaction times between healthy controls and medically at-risk older drivers with three research questions: (1) is there a statistically significant difference in performance time between medically at-risk individuals and the controls, (2) does the type of medical condition (e.g., neurological, cognition, complex medical conditions) differentiate performance, and (3) does the Vision Coach™ differentiate between drivers based on fitness to drive.

Methods: A cross sectional quasi-experimental design was used. Data collection was part of a comprehensive driving evaluation with a fitness to drive outcome. The Vision Coach™ "Full Field 60" task was used to collect the reaction times to compare between the two groups, three diagnostic categories, and fitness to drive outcome. The "Full Field 60" task required participants to tap 60 red dots that would randomly illuminate on the board. The dots would appear one at a time and would not disappear until the participant had tapped the dot. Four trials were conducted, with the first trial acting as a practice round.

Results: Independent t-tests showed a significant difference ($p < .001$) in trial times between healthy controls and medically-at-risk adults. No significant difference ($p = .141$) was found between diagnoses groups. The Vision Coach™ was able to differentiate ($p < .001$) between those who "passed" and those who "failed" a driving evaluation.

Conclusion: Results of this study indicate that being medically-at-risk for driving impacts an individual's ability to quickly react to a visual stimulus. However, diagnosis type does not significantly impact trial time. Lastly, the Vision Coach™ was shown to be an effective screening tool for determining fitness to drive.



Effects of Background Music on Experienced Driving Performance in Individuals with Autism Spectrum Disorder Compared to Neurotypical Individuals

Researcher: Sydney Romer under the direction of Dr. Anne Dickerson

Purpose: To investigate the effects that self-selected background music has on the driving performance of experienced drivers with Autism Spectrum Disorder (ASD) compared to experienced neurotypical drivers

Methods: A 2 (autism/neurotypical) x 2 (music/no music) x 2 (hazards/wayfinding) factorial design was used. Participants included 34 neurotypical adults and 5 adults with ASD who were experienced drivers. All participants completed a driving history questionnaire and Sensory

Profile before completing four different driving scenarios (two hazard and two wayfinding) on the driving simulator. During two of the driving scenarios, the participant listened to self-selected music. The order the participant completed the driving/music was counterbalanced to prevent learning effects. The dependent variable of driving performance was measured by the Performance Analysis of Driving Ability, both the total and four subcategories.

Results: Repeated measures ANOVA showed no significant difference in driving performance on the total scores between music conditions ($p = 0.76$); however there was a significant difference between driving conditions ($p=0.001$) and between diagnosis groups ($p=0.049$) indicating that drivers with ASD had higher driving performance scores than their neurotypical counterparts. No significant interaction effects were found.

Conclusion: Results of this study indicate that music does not significantly affect driving performance either positively or negatively, contradicting previous studies. However, most studies have been done with novice drivers, thus experience may have made a difference. In addition, the higher performance of the drivers with ASD suggest that (1) experience improves performance, and (2) drivers with ASD may be better drivers than neurotypical drivers as they are more likely to drive following speed limitations.

Projects:



Normative Data for DriveSafety™

Researcher: Margaret Bitter and Elizabeth Early under the direction of Dr. Anne Dickerson

Purpose: To establish normative data for the scanning and multitasking tasks on the DriveSafety™ simulator.

Methods: Participants in the study completed seven different level of the *Functional Object Detection* tasks on the DriveSafety™ interactive driving simulator.

These tasks require participants to continuously scan and use multitasking skills with increasing difficulty with each task. The tasks include: maintaining a target speed and lane position while responding to the brake lights and environmental distractors. Data was collected at each level of performance in terms of percent of time in lane position, mean of target speed, and target recognition accuracy. Participants included 29 females ranging from 22-30 years old.

Results: Participants were able to complete all levels with minimal difficulty and optimal scores for lane position, speed and target recognition. Only two participants failed to meet the criteria and needed to repeat one task.

Conclusion: Although limited in terms of the population, this data begins the collection process of establishing normative data for this multitasking assessment. Once normative data is established, this assessment tool may potentially be an assessment for multitasking and contribute to determining fitness to drive.



Exploring the Role of Telehealth to Improve Writing Self-Perception in 7–12-Year-Old Students

Researcher: Virginia Middleton under the direction of Dr. Denise Donica

Purpose: To determine the impact a telerehabilitation handwriting program has on influencing school-aged children's handwriting skills as determined by their own handwriting self-perception

Method: This study used a single group, pre-post experimental design. A group of five students between the ages of 7-12 participated in an 8-week long program to address writing skills. Each week students participated in a group warm-up session that incorporated speech and occupational therapy skills followed by two individualized therapy sessions: one with an occupational therapy student addressing handwriting skills and another with a speech-language pathology student addressing spelling skills. After assessing the student's beginning skill level and self-perception, students received unique interventions specifically addressing areas for growth. After the 8-week intervention program, students were reassessed.

Results: Participants showed improvements in Here's How I Write: A Child's Self-Assessment and Goal Setting Tool: Improving Handwriting Abilities in School-Aged Children (HHIW) between pre-

test and follow-up. Specifically, average HHIW score increased by 1.8 points from pre-test to post-test. Average scores increased by 6.4 points from post-test to follow-up.

Conclusion: These results suggest that the use of the handwriting curriculum in a virtual intervention format is an effective way to create positive change regarding students' self-perception of their handwriting skills. Self-perception may be an area that the therapist chooses to incorporate into their sessions as increase in self-perception can lead to improvements in academic outcomes.



Use of WebEx versus Teams for Group and Individual Writing Interventions for 7-12 Year Old Students

Researcher: Taylor Whaley and Sarah Woodlief under the direction of Dr. Denise Donica

Purpose: The purpose of this study was to explore the use of video conferencing to deliver handwriting intervention during the COVID-19 pandemic. This study specifically examined the use of and satisfaction with

two virtual platforms for providing telehealth services to children. Microsoft Teams and WebEx were the virtual platforms used to provide both group and individual therapy sessions.

Method: The "I Can Write" program included eight weekly sessions using Microsoft Teams (first four sessions) and WebEx (last four sessions), provided by occupational therapy and speech language pathology graduate students. Each session was broken up into three 20-minute sections. This provided a unique opportunity to explore the features of conducting telehealth to students in both group and individual formats through two different platforms. A parent survey was conducted to gauge overall family satisfaction with the program as well as learn about platform preferences.

Results: Overall, families were satisfied with the virtual program. The main identified strength of this telehealth program was that required materials for the program were provided to the participants ahead of time. WebEx was clearly identified as the preferred platform by parents and interventionists. Lastly, the features and limitations for each video conferencing platform.

Conclusion: The findings of this study can help guide informed decisions regarding choice of platform when providing virtual handwriting interventions through telehealth. Practitioners should consider clients' conditions, familiarity and comfort level with technology, what they need to see clients doing during the session, and necessary physical and digital manipulatives to enhance the teletherapy session.



The Relationship between Total Activity Count and Assistance Level of Adults Receiving Inpatient Rehabilitation Services

Researcher: Amber Christensen and Caroline Sloan under the direction of Dr. Young Kim

Purpose: This study investigated the relationship between the functional outcomes of adults receiving inpatient rehabilitation services and discrepancies among their levels of physical activity while in therapy versus

times they are not in therapy.

Method: Participants' (n=30) physical activity levels were measured by total activity counts from ActiGraph during occupational therapy, physical therapy, and speech-language pathology services separately. Their functional outcomes were measured by the assistance levels on the self-care and mobility scales from the Medicare CARETool. The total activity counts were standardized to reflect the amount of activity a participant engages in per minute, which varied due to the durations of time that the participants wore the ActiGraph while receiving inpatient rehabilitation services.

Results: Overall, the self-care score improved from 3.66 (SD=0.63) to 5.17 (SD=0.63) and mobility score improved from 3.29 (SD=0.53) to 5.01 (SD=0.69) between admission to discharge. There was no significant correlation between total activity count discrepancies and functional outcomes during any therapy services ($p > .05$).

Conclusion: Inpatient adults' physical activity levels inside and outside of therapy may not be associated with changes in functional outcomes. Adults receiving inpatient rehabilitation may need time to rest following the intensive therapy that they receive. These adults may not be active enough during therapy and non-therapy times.



Predictors of Physical Activity Level During Therapy Times in Adults Who Are Receiving Inpatient Rehabilitation Services

Researcher: Samantha Droese and Allison King under the direction of Dr. Young Kim

Purpose: To identify the predictors of physical activity during therapy times among adults in an inpatient rehabilitation facility

Methods: A prospective, repeated measures study design across three rehabilitation services (occupational therapy [OT], physical therapy [PT], and speech-language pathology [SLP] services) was conducted at inpatient rehabilitation units. Thirty adults receiving inpatient rehabilitation were recruited via convenience sampling. Participants wore the ActiGraph GT9X on their wrists during their stay in inpatient rehabilitation to collect data on their physical activity level. Standardized Total Activity Counts (TAC) were used to quantify the participants' average active movements during therapy times. Therapy times were classified as combined-rehabilitation, OT, PT, and SLP services.

Results: Mean age was 63.3 years (SD=13.0), Mean length of stay in inpatient rehabilitation was 13.3 days (SD=3.9) and average number of diagnoses was 10.3 (SD=4.8). Significant associations were found between standardized TAC for combined-rehabilitation and age ($r = -0.477, p = 0.008$), acute care length of stay ($r = -0.390, p = 0.033$), and Johns Hopkins Fall Risk Assessment score ($r = -0.392, p = 0.032$). Significant associations were also found between standardized TAC for OT and age ($r = -0.429, p = 0.018$) and Johns Hopkins Fall Risk Assessment score ($r = -0.460, p = 0.011$). Lastly, significant associations were found between standardized TAC for PT and age ($r = -0.513, p = 0.004$) and acute care length of stay ($r = -0.419, p = 0.021$). No significant predictors of physical activity level during therapy times were found.

Conclusion: Our study showed that age, acute care length of stay, and the Johns Hopkins Fall Risk Assessment scores had statistically significant negative associations with TAC for combined-rehabilitation, with some of the same factors associated with solely OT or PT. This study also provides preliminary information for future studies to build upon to determine predictors that will help practitioners determine physical activity levels.



Occupational Therapy Patient Education Materials: Universal Design for Learning and Health Literacy

Researchers: Paige Asbury, Carolina Castillo, Alyssa Gray, and Kristin Heyward under the direction of Dr. Lynne Murphy

Purpose: The purpose of this study was to determine 1) to what degree patient education materials used in occupational therapy follow health literacy guidelines, and 2) to what degree patient education materials used in occupational therapy follow Universal Design for Learning (UDL) guidelines.

Method: This descriptive case study was implemented for four cases, with written patient education documents being defined as one case. Patient education materials were received from occupational therapy practitioners regarding total shoulder replacement post-surgical precautions, fine motor therapeutic exercise, upper body therapeutic exercise, and energy conservation principles. These materials were assessed regarding health literacy using the Patient Education Materials Assessment Tool for Printed Materials and the Suitability Assessment of Materials. The materials were assessed for adherence to principles of UDL using a checklist adapted from the West Virginia Department of Education. After scoring, the patient education materials were improved by the research team, and then scored again with the health literacy and UDL assessments, before being returned to the occupational therapy practitioners.

Results: Three of the four patient education materials were created by the practitioners, with health literacy scores ranging from 40% to 88% and UDL scores ranging from 20% to 27%. The fourth set of materials had been created commercially and had 100% scores for health literacy, but a 39% score for UDL. After revision by the research team, improvements were made in all scores, with health literacy scores of 83% to 100% and UDL scores ranging from 48% to 70%.

Conclusion: Patient education materials from published or copyrighted sources tended to demonstrate higher pre-test scores but were less suitable for modification. Clinician-created forms had lower pre-test scores but allowed for more meaningful improvements. As UDL supports multiple means of representation to facilitate learning, printed materials alone do not allow for learning in all clients. Occupational therapy practitioners demonstrated limited application of health literacy and UDL, which may negatively influence patient learning and outcomes. Supports to therapists to improve knowledge and application of these principles have the potential to facilitate improved patient outcomes.



Effects of a Collaborative Occupational Therapy Interactive Vaulting Program on Executive Function and Group Participation in Children with Disabilities: A Pilot Study

Researchers: Danielle Goldberg, Olivia Fisher, Zoe Shirk, and Mackenzie Thorley under the direction of Dr. Heather Panczykowski

Purpose: The aim of this 10-week pilot collaborative Interactive Vaulting occupational therapy program was to provide opportunities to practice targeted social skills.

Method: This quasi-experimental, single-group, pretest-posttest study utilized the Cognitive Orientation to daily Occupational Performance approach to structure interventions. Sessions were 60 minutes in length for each and included stationary barrel practice, horse grooming, team-building games and activities, and vaulting maneuvers on the horse.

Results: Ten males and five females completed the 60-minute sessions. Results showed significant improvements in executive function according to the Behavioral Rating Inventory-2 administered by the interactive vaulting instructor; however, this trend was not mirrored by parents. Significant improvements were also found in the participants' activity participation, social interaction, and group membership according to the Social Profile.

Conclusion: Although this study had a small sample size and the results should be interpreted with caution, these results provide opportunity for reflection. The contrasting performance perceptions of the parents and the interactive vaulting instructor are indicators that the skills learned in the group were not generalized to other settings. Further iterations of the program included a parent education

component of the strategies utilized in the group, such as guided facilitation and how to incorporate the social skill goals into the child's daily routine.



The Role of a Child's Tolerance for Error on Active Participation in Upper Extremity Neurorehabilitation

Researcher: Rebecca Auten, Hannah Bebber, Melissa Thomas, and Keely Price under the direction of Dr. Kelly McGloon

Purpose: To determine the impact of a child's perceived tolerance for error on the amount of active participation in constraint-induced movement therapy among children with cerebral palsy. We hypothesized that greater perceived tolerance for error would increase active participation in a constraint-induced movement therapy program.

Method: Children eligible to participate in the study were aged 4-10 with the ability to follow simple 2-step directions to participate in therapy activities; at least 10° of active range of motion in the wrist and 20° for the elbow and shoulder. Children completed 5 days of therapy for 6 hours each day. The Dimensions of Mastery Questionnaire was completed by the participant's parents prior to camp to help determine the child's perceived tolerance for error during tasks. Active participation in therapy was tracked by occupational therapy students according to the number of repetitions completed in each activity.

Results: The results of our linear regression indicated that tolerance for error was a statistically significant predictor ($R^2 = 0.338$, $p = 0.023$) for the variation in total repetitions.

Conclusion: Based on our findings, occupational therapist clinical decision making in creating the "just right challenge" should not be solely based the child's tolerance for error as it only accounts for approximately a third of active participation in treatment. Other factors impacting participation should further researched and considered in clinical reasoning.