# Exploring the Impact of Experiential Learning on Physical Therapy Student Self-Efficacy with Neurologic Populations

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**Abstract**

**Purpose.** The purpose of this study was to analyze the relationship between physical therapy student participation in an experiential learning activity with neurologic populations and physical therapy student self-efficacy with neurologic populations.

**Background.** Physical therapy education programs provide opportunities for Doctor of Physical Therapy students to develop self-efficacy in their clinical and professional skills. It is unknown if these experiences adequately expose students to and prepare students for the rapidly growing and complex population of adults with neurologic diagnoses in the United States. Physical therapy is one evidence-based solution to address the quality of life and healthcare burdens of individuals living with neurologic diagnoses. Current research shows that experiential learning is one mode of education that influences physical therapy students' confidence in working with specific groups of patients and confidence in their professional skills.

**Methods.** A sequential-explanatory mixed methods design was used to examine a cohort of 28 physical therapy students who participated in NeuroWellness, a community-based exercise program for individuals with neurologic diagnoses. A 2x3 repeated measures ANOVA evaluated students' scores on the Physiotherapy Self-Efficacy (PSE) neurologic subscale, and a one-way ANOVA determined the relationship between mastery experiences and self-efficacy. A thematic analysis of student reflections was performed to provide richer explanations of the participants' experiences.

**Results.** Participation in NeuroWellness had a statistically significant effect of time ($F(1,27)=131.14$, $p<.001$), effect of semester of participation, ($F(1, 38) = 71.60$, $p<.001$), and interaction between time and semester on total self-efficacy with neurologic populations, ($F(1, 40)$, $p=.003$). Specific items on the PSE also yielded significantly improved results, including confidence in preparedness ($F(2, 49)$, $p=.021$), intervention skills ($F(2, 44)$, $p<.001$), and evaluation skills ($F(1, 10) = 13.08$, $p<.001$). There was no significant relationship between final self-efficacy scores and the number of success experiences for the participants. Analysis of student narrative reflections elaborated on these outcomes and included themes of concrete experiences, confidence mindset, and self and client success.

**Conclusions.** After participating in eight weeks of an experiential learning activity with neurologic populations, PT students exhibited significantly improved self-efficacy with neurologic populations. This outcome demonstrated that experiential learning is an effective method that should be employed in PT education programs to prepare practitioners to meet this population's increasing and complex needs.

***Keywords:*** neurologic, physical therapy, experiential learning, self-efficacy, mastery experience, success experience

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## List of Abbreviations

ANPT ..........................Academy of Neurologic Physical Therapy

CAPTE........................Commission on Accreditation in Physical Therapy Education

DALY .........................Disability-Adjusted Life Year

DPT .............................Doctor of Physical Therapy

IRB..............................Institutional Review Board

MBU ...........................Mary Baldwin University

OSCE ..........................Objective Structured Clinical Examination

PSE..............................Physiotherapist Self-Efficacy Questionnaire

PT ................................Physical Therapy

SAYMCA ...................Staunton-August YMCA

U.S. .............................United States

## Chapter One: Introduction

Since 2011, the number of individuals in the United States with neurologic disorders has doubled and the burden from most major neurologic disorders has increased by at least fivefold (Feigin et al., 2021). As the United States (U.S.) older population grows, increasing demands are placed on the U.S. healthcare system. Concurrently, this older population has experienced an increased incidence of risk factors for neurologic disorders, including obesity and increased fasting blood glucose (Feigin et al., 2021). The top nine burdensome neurologic disorders in the United States include Alzheimer’s disease and dementia, stroke, traumatic brain injury, migraines, epilepsy, multiple sclerosis, traumatic spinal cord injury, and Parkinson's disease (Gooch et al., 2017). In 2014, these nine disorders cost 800 billion dollars to the United States, and this is projected to increase exponentially with the growth of the elderly population. These increases in prevalence and costs highlight the urgent need for comprehensive healthcare prevention and management strategies.

Individuals with neurological diagnoses have a greater physical and economic burden of care than those with other chronic health conditions (Feigin et al., 2017). One evidence-based solution for managing and preventing neurologic disease impacts is physical therapy (PT). Studies have demonstrated that PT interventions improve physical independence and mobility in individuals with neurologic disorders (Barta et al., 2018; Carmeli, 2017; Peiris et al., 2018; Rafferty et al., 2022). Additionally, PT participation is associated with significantly lower healthcare costs for individuals with neurologic diagnoses (De Vries et al., 2016; Ypinga et al, 2018).

Despite the increasing prevalence and burden of individuals living with neurologic disorders, it is not well-established whether PT students are sufficiently prepared to meet the increasing needs of this demographic. Studies indicate that PT students have limited exposure to individuals with disabilities due to neurologic disorders (Clarke et al., 2023; Shields et al., 2023). Moreover, research demonstrates that PT students report decreased confidence in working with individuals with neurologic disorders (Greenfield et al., 2015).

The most common area of PT practice is outpatient rehabilitation (American Physical Therapy Association, 2023). Studies have shown that it is more common for patients to seek care for musculoskeletal diagnoses in outpatient rehabilitation than for other conditions and that individuals with neurologic diagnoses underutilize outpatient PT services (Fullard et al., 2017; Machlin et al., 2011; Sandstrom, 2017). Physical therapy students often lack exposure to patients with neurologic disorders due to a historical emphasis on outpatient rehabilitation, signaling a need for change in the landscape of PT training and practice. To address this evolving challenge, PT education programs must enhance students' exposure to individuals with neurologic disorders to better prepare them for clinical competence with this population.

Physical therapy education programs mainly provide practical skills training to their students through full-time clinical experiences (Commission on Accreditation in Physical Therapy Education [CAPTE], 2024). Providing additional educational experiences, integrated into the didactic curriculum, to supplement and prepare students for clinical education is one way to enhance students' confidence in their ability to work with individuals with neurologic disorders. One educational approach that increases students' exposure to realistic clinical situations is experiential learning (Kolb, 1984). Through the constructs of experiential learning—including concrete experiences, abstract conceptualization, reflective observation, and active experimentation—students apply didactically learned skills and achieve significant improvement in professional behaviors (Kolb, 1984; Lowe et al., 2022; Paparella-Pitzel et al., 2021; Qutishat et al., 2021). The body of literature on experiential education in physical therapy shows positive outcomes that include increased PT student confidence in working with specific populations, in clinical skills, and in professional behaviors (Barta et al., 2022; Flowers et al., 2020; Shields & Taylor, 2014; Wolden et al., 2019).

Experiential learning is most effective in task- and situation-specific contexts (Kolb et al., 2001). Self-efficacy is a measure of confidence in one's ability to perform a skill or work with a specific population and is task- and situation-specific (Bandura, 1977; Bandura, 1997). Self-efficacy has been shown to be positively associated with clinical skill performance and acquisition (Venskus & Craig, 2017). The four sources of self-efficacy beliefs are mastery experiences, vicarious experiences, verbal persuasion, and physical or affective states. The sources are often features of experiential learning activities that support the growth of self-efficacy in students (Bandura, 1977; Van Lankveld et al., 2017).

Given the increased demand for neurologic PT, it is important to investigate the most impactful methods of preparing PT students for working with this population. Research shows that students benefit from more exposure to individuals with neurologic disorders (Clarke et al., 2023; Greenfield et al., 2015; Shields et al., 2023). This project seeks to examine the physical therapy student outcomes related to developing self-efficacy with neurologic populations after participating in an experiential learning activity.

**Statement of the Problem**

It is not known whether PT education programs adequately provide opportunities in their curricula to develop students' self-efficacy when working with individuals with neurological disorders. CAPTE (2023) mandates that neurologic physical therapy is one of the areas of clinical knowledge that a program must address, but does not define the extent to which a program's curriculum or clinical experiences must focus on this area. As more individuals over 65 will need to access PT care due to the increased prevalence of neurologic conditions in the aging U.S. population, PT education programs must strive to meet the dynamic demands of this population (Feigin et al., 2021). They must ensure that entry-level physical therapists are prepared to confidently and competently work with patients with a more complex burden of care associated with living with a neurological disorder.

**Purpose of the Research**

The purpose of this study was to analyze whether PT student participation in an experiential learning activity with neurologic populations is associated with PT student self-efficacy with neurologic populations. Specifically, this study examined PT student self-efficacy with neurologic populations after participating in NeuroWellness. NeuroWellness is a community-based exercise program for individuals living with neurologic disorders at the Staunton-Augusta YMCA (SAYMCA). The clients at NeuroWellness are adults who are referred by a physician to the program and typically have a diagnosis of stroke, Parkinson's disease, cerebral palsy, traumatic brain injury, and other neurologic disorders (SAYMCA, n.d.).

The first independent variable was participation in NeuroWellness, and participation was defined by semester. During the first semester, none of the students participated in NeuroWellness. During the second and third semesters, all students participated in NeuroWellness.

A second independent variable was engaging with a success experience during the experiential learning activity (Kolb, 1984). A success experience—achieving the desired outcome in a situation—was determined by measuring the change in a client's physical performance on outcome measures during NeuroWellness. The student either experienced success—a positive change in a client's performance—or did not experience success—a negative change or no change in a client's performance.

The dependent variable was total self-efficacy as measured by the neurologic subscale of the Physiotherapy Self-Efficacy questionnaire (PSE) (Van Lankveld et al., 2017). The PSE has been established as a valid and reliable measure of self-efficacy in PT students (Van Lankveld et al., 2017). Additionally, the PSE is a responsive measure of domain-specific self-efficacy, including neurologic practice. In addition to total self-efficacy, the five PSE sub-scores, confidence in preparedness, confidence in communication skills, confidence in performing examination skills, confidence in synthesis and evaluation skills, and confidence in skillfully providing interventions, will be measured.

**Research Questions and Hypotheses**

The primary research questions and hypotheses were:

Q1. Is PT student participation in a neurologic experiential learning activity associated with students' self-efficacy when working with neurologic populations?

H1.1o: PT students who participate in a neurologic experiential learning activity will not have significantly improved overall self-efficacy with neurologic populations.

H1.1a: PT students who participate in a neurologic experiential learning activity will have significantly improved overall self-efficacy with neurologic populations.

H1.2o: PT students who participate in a neurologic experiential learning activity will not have significantly improved feelings of preparedness for working with neurologic populations.

H1.2a: PT students who participate in a neurologic experiential learning activity will have significantly improved feelings of preparedness for working with neurologic populations.

H1.3o: PT students who participate in a neurologic experiential learning activity will not have significantly increased confidence in their communication skills for working with neurologic populations.

H1.3a: PT students who participate in a neurologic experiential learning activity will have significantly increased confidence in their communication skills for working with neurologic populations.

H1.4o: PT students who participate in a neurologic experiential learning activity will not have significantly increased confidence in performing examination skills for working with neurologic populations.

H1.4a: PT students who participate in a neurologic experiential learning activity will have significantly increased confidence in performing examination skills for working with neurologic populations.

H1.5o: PT students who participate in a neurologic experiential learning activity will not have significantly increased confidence in their synthesis and evaluation skills for working with neurologic populations.

H1.5a: PT students who participate in a neurologic experiential learning activity will have significantly increased confidence in their synthesis and evaluation skills for working with neurologic populations.

H1.6o: PT students who participate in a neurologic experiential learning activity will not have significantly increased confidence in skillfully providing interventions with neurologic populations.

H1.6a: PT students who participate in a neurologic experiential learning activity will have significantly increased confidence in skillfully providing interventions with neurologic populations.

Q2. Is the amount of PT student engagement with success experiences associated with a PT student's total self-efficacy score when working with neurologic populations?

H2.1o: PT students who engage with more success experiences during a neurologic experiential learning activity will not have significantly greater total self-efficacy scores.

H2.1a: PT students who engage with more success experiences during a neurologic experiential learning activity will have significantly greater total self-efficacy scores.

**Implications of the Research**

As the rates of individuals living with neurologic diagnoses increase, evidence-based educational approaches are needed to affect positive change in the physical therapists who care for neurologic patients, including improving their clinical outcomes, improving patients' satisfaction with their life experiences, and reducing patients' healthcare costs. Studies show that experiential learning has positive effects on self-efficacy in PT students with specific populations (Barta et al., 2022; Flowers et al., 2020; Lowe et al., 2022; Qutishat et al., 2021; Shields & Taylor, 2014; Wolden et al., 2019). Determining if this relationship exists for PT students with neurologic populations will allow PT educators to design more effective learning experiences to help students grow in their confidence with this population. Ultimately, this may affect meaningful change in student preparation for treating patients with neurological health conditions allowing PT students to impact positive clinical outcomes. Further, this study will describe the use of the PSE as a method of student learning assessment to determine how educational approaches affect PT student self-efficacy outcomes.

**Organization of the Study**

This study is organized into five chapters. The first chapter presented an introduction to the study. The second chapter will present a literature review about the prevalence and burden of neurologic disorders in the U.S., the role of PT and PT education with neurologic disorders, and the implications of self-efficacy and experiential learning theories in PT student neurologic physical therapy education. The third chapter will describe the methods of the proposed study. The fourth and fifth chapters will describe the results of the data and provide conclusions of the findings from this study.

## Chapter Two: Review of the Literature

Neurologic disorders rank as the primary contributor to disability in the world and the second leading cause of death (Dumurgier & Tzourio, 2020). While there have been promising advancements in the United States, where the burden of neurologic disorders has improved since 2007 due to improved medical diagnosis and management, challenges remain (Feigin et al., 2021). The incidence and prevalence of the most prominent neurologic disorders in the United States, including 14 disorders, are on the rise. This increase results from the largest growth in the population of older adults in U.S. history (Caplan, n.d.). In the last decade, the increase in the number of older adults matched the growth from the previous 50 years combined. With individuals over the age of 65 facing an increased risk of developing a neurologic disorder or incurring a neurologic injury, it is estimated that 60 percent of adults living in the United States are diagnosed with at least one neurologic disorder (Feigin et al., 2021). The leading risk factors for neurologic disease—being overweight and having high fasting blood glucose—are also on the rise in the United States.

The U.S. medical system needs an effective solution to manage the increased burden of adults living with neurologic disorders. Physical therapy (PT) is an evidence-based solution that has been shown to positively impact both the quality of life and the economic burden associated with living with a neurologic diagnosis (De Vries et al., 2016; Ypinga et al, 2018). Considering this, PT education programs must ensure that they are producing clinicians with the professional skills and confidence, or self-efficacy, needed to meet the complex task of improving the quality of life and burden of care for this population. Though preliminary work shows in what direction PT education programs should aim their efforts, the field has not established how to comprehensively execute the training of PT students who will be tasked with meeting the needs of patients with neurologic disorders (Bradford et al., 2023).

**Epidemiology of Neurologic Disorders in the United States**

In the Americas, the United States has the highest prevalence of burden due to neurologic disorders (47.39 deaths per 100,000 neurologic disorders) (Pan American Health Organization [PAHO], 2021). Moreover, the United States has the highest disability-adjusted life years (DALY) (1503.39 per 100,000). When compared to the average DALY in the Americas, 552.30 per 100,000, this demonstrates that individuals in the United States are living longer with disability due to neurologic disease than anywhere in the region and experiencing a higher level of burden of care to sustain those life years (PAHO, 2021).

The incidence of neurologic disorders largely remains stable or declining due to improved diagnosis and medical care (Feigin et al., 2021). The major neurologic disorders are increasing in prevalence, however. In the United States, the three most burdensome neurologic disorders are stroke, Alzheimer's disease and other dementias, and migraines (Feigin et al., 2021). Patients with stroke, Alzheimer's disease, and Parkinson's disease are living longer than ever before (Raggi & Leonardi, 2015). Since 1990, the prevalence of each of these disorders has substantially increased. The prevalence of stroke in the United States has increased 64.8% over the past three decades and was 3.3% in adults 20 and over in 2020 (Feigin et al., 2021; Tsao et al., 2023). During this time, the prevalence of Alzheimer's and other dementias has increased 48.4% and, in 2022, was 11% in adults over 65 years (Feigin et al., 2021; Alzheimer's Association Report, 2022). The prevalence of Parkinson's disease has increased 89.9% since 1990 and was 0.55% in all adults in 2017 (Feigin et al., 2021).

***Physical Impact***

Since individuals are surviving neurologic diseases and injuries longer, the burden of living with them is higher. Living with neurologic disorders is marked by a range of impairments that affect multiple body systems, which result in restrictions in daily functioning and hinder an individual's capacity to engage in their life and societal roles (Raggi & Leonardi, 2015). The neuromuscular system, which controls the body's motor and sensory systems, is the body system most affected by neurologic disorders. This leads to diminished mobility, decreased independence with mobility, and impaired participation in daily activities. These impairments and limited function result in decreased independence and speed of walking, poor balance, an increased risk of falls, decreased independence to perform self-care activities like bathing and dressing, and a decreased ability to drive and access the community (Alzheimer's Association Report, 2022; Tsao et al., 2023). Additionally, these diagnoses have impaired cognition components including memory loss, decreased executive function, and impaired communication (Dumurgier & Tzourio, 2020). Due to poor physical function, fatigue, and decreased ability to participate in one's life roles, living with a neurologic disease or injury is associated with the lowest-rated quality of life compared to other systems (musculoskeletal, endocrine, respiratory) (Bogart & Irvin, 2017).

***Economic Impact***

Living with a neurologic disease or illness is more costly than other illnesses because of the need for assistance with self-care and daily function and the inability of individuals to be fully productive in work and other life roles (Raggi & Leonardi, 2017). Furthermore, communication and cognitive impairments are both common in neurologic disorders and complex issues to manage in daily life and medical care (Dumurgier & Tzourio, 2020). Physical impairments, cognitive impairments, and decreased independence in function are not only difficult for an individual to manage but also place an increased burden on the families and caregivers of the individuals. Not only are daily life and medical care more costly and complicated on an individual level, but individuals with neurologic disorders are also more costly to society. Almost half of individuals who apply for disability benefits report having a neurological diagnosis (Raggi & Leonardo, 2017). Additionally, as the prevalence of individuals living with neurologic diagnoses grows in the United States, this group has poorer access and is underserved by the U.S. healthcare system (Gustafsson et al., 2016).

## The Role of Physical Therapy in Neurological Disorder Management

While adults living with neurologic disorders present with complex and chronic health issues, neurologic PT enhances the health and wellness of individuals with neurologic disorders (Barta et al., 2022; Rafferty et al., 2022). PT promotes health by supporting individuals through improving mobility, improving independence with activities of daily living, and participating in regular exercise. These interventions increase patients' independence in daily function and improve their well-being, which enables individuals to pursue health in all areas of their lives. By providing education, treating impairments, and teaching compensatory strategies, PT has the potential to improve the quality of life in individuals with neurologic disorders (Carmeli, 2017; Peiris et al., 2018). Since most neurologic diseases and illnesses are incurable, PT emphasizes that health does not simply mean the absence of disease (Rafferty et al., 2022). Research shows that through the process of neuroplasticity, the ability of the human nervous system to change, individuals with neurologic disorders can recover some types of function but require skilled PT to do so (Carmeli, 2017).

Physical therapy not only intervenes in individuals diagnosed with a neurologic disorder or injury but also addresses other modifiable risk factors to help prevent the onset of future neurologic disease or the worsening of existing disease (Rafferty et al., 2022). As the incidence of modifiable risk factors for neurologic disease is increasing in adults in the United States, PT intervenes in the areas of sleep, stress, nutrition, and smoking. Therefore, PT can improve quality of life via improved functional mobility and by improving patients' health by mitigating the effects of other lifestyle risk factors through patient education and intervention (Carmeli, 2017).

In addition to enhancing patients' physical health and function, PT has the potential to improve the economic impact of living with a neurologic disorder (De Vries et al., 2016; Peiris et al., 2018; Ypinga et al., 2018). Studies have shown that individuals who were treated by a physical therapist with specialty experience in neurologic physical therapy required fewer healthcare and PT visits, had a lower cost of healthcare overall, experienced lower rates of mortality, and had a reduced need to see other healthcare providers (De Vries et al., 2016; Ypinga et al., 2018). Moreover, patients with neurologic diagnoses who received additional specialized PT care, when compared to typical PT care, reported decreased time spent in hospital care, significantly improved independence with activities of daily living, significantly improved health-related quality of life, and significant healthcare cost savings (Peiris et al., 2018). These studies demonstrate the impact PT can have on mitigating the personal and societal burdens faced by individuals living with neurologic disorders in the United States.

The demand for neurologic rehabilitation is on the rise due to the increasing prevalence of neurologic disorders in the United States. Additionally, patients seeking care in general outpatient and musculoskeletal outpatient therapy settings are more likely to present with a neurologic diagnosis alongside their primary reason for seeking physical therapy (Feigin et al., 2021). Consequently, PT education programs must comprehensively train students to meet the evolving needs of the U.S. population. PT students must develop the necessary skills and confidence to use those skills to meet the complex needs of individuals with neurologic disorders and to alleviate the heightened burden of care and the economic impact of those complexities (De Vries et al., 2016; Raggi et al., 2015).

### *Physical Therapy Student Education for Neurologic Physical Therapy*

The PT profession comprises the largest group of medical professionals who apply non-pharmacologic and non-surgical interventions (Dean et al., 2011). As integral health providers for patients with neurologic disorders, the PT profession works to ensure physical therapists can meet the increasing demands of this demographic. The primary mode through which this is accomplished is appropriate and robust training of students in PT education programs. Furthermore, the goal of PT education is to train safe and competent physical therapists to maximize patients' independence in their homes and society.

The Commission on Accreditation in Physical Therapy Education (CAPTE) sets curricular standards for PT education programs to promote training that produces a field of PT generalists who competently treat patients across the lifespan and in all settings (Bradford et al., 2023). The CAPTE standards define student and program outcomes by emphasizing the necessary general skills for patient management in entry-level practice. For example, in Standard 7, CAPTE indicates programs should, "prepare students to achieve educational outcomes required for initial practice in physical therapy" (CAPTE, 2023, p. 40). CAPTE indicates important skills of general clinical practice, like screening and examination, evaluation, diagnosis, prognosis, and plan of care. However, CAPTE does not define how much educational content should be covered in each clinical area of practice, the necessary skills for each clinical area, or the content needed to achieve entry-level practice in specific clinical areas, like neurologic physical therapy.

To enable student physical therapists to learn to enhance the function of the movement system for individuals with neurologic disorders, the Academy for Neurologic Physical Therapy (ANPT) determined a set of seven core education competencies that contain several sub-competencies to support effective neurologic PT education (Bradford et al., 2023). The seven competency areas include patient life role participation, interprofessional communication and collaboration, health promotion and wellness, movement science, assistive technology and equipment, evidence-based practice, and provider health and wellness. Though CAPTE has set standards and the ANPT has defined competencies, it is unknown how much didactic content and clinical experiences are devoted across education programs to neurologic content. The largest practice area in physical therapy is outpatient physical therapy (42%), with private outpatient practices dominating this category of practice (APTA, 2023). Though many outpatient practices treat complex patient cases, the most standard case is an outpatient orthopedics patient. Therefore, curriculum content and student experiences may focus more on this area.

Commonly, PT education programs begin with two years of didactic classroom-based learning followed by one year of full-time clinical experience in more than one setting (CAPTE, 2024). Approximately 77% of a student’s time learning in their PT education program occurs in a classroom or lab, and 23% occurs in clinical education. During full-time clinical education, students assume increasing levels of responsibility and aim to practice as entry-level practitioners under the supervision of clinical instructors. On average, students spend 35 weeks in full-time clinical education (CAPTE, 2024). Most PT education programs cannot ensure that PT students interact with complex patients across the lifespan and in all settings in their full-time clinical education.

PT students report decreased confidence in their ability to work with individuals with neurologic disorders (Greenfield et al., 2015). This decreased confidence may result from inexperience with individuals living with disabilities and a lack of interactions with people with disabilities in the community (Clarke et al., 2023; Shields et al., 2023). This decreased confidence may also be due to the challenge of managing the complex rehabilitation issues adults with neurologic disorders face (Barta et al., 2022). Moreover, Van Lankveld et al. (2017) found that some PT education programs provide musculoskeletal rehabilitation didactic curricula first, potentially leading to greater student confidence in this area compared to others, such as neurologic rehabilitation.

PT education programs prepare students to practice clinically (Van Lankveld et al., 2017). Since PT students cannot interact with all demographics in their full-time clinical experiences, PT didactic education should fill in the gaps in their practical learning. This enables students to both acquire a large amount of knowledge and psychomotor skills and competently apply them across demographics. Furthermore, clinical practice across varied populations requires competence in both technical skills and non-technical professional skills like communication, confidence, and attitude (Qutishat et al., 2021). These non-technical professional skills are challenging to teach in a classroom and better acquired and practiced in real-life and practical experiences.

## Experiential Learning in Physical Therapy Education

Experiential learning in PT education effectively bridges the gap between classroom and practice by prompting students to apply learned didactic and technical content in real-life scenarios (Lowe et al., 2022; Qutishat et al., 2021). Students learn most effectively when they solve problems in practical environments (Qutishat et al., 2021). Through experiential learning opportunities that provide concrete experiences, opportunities for reflection, avenues for abstract conceptualization, and ample time for active experimentation, PT students can develop professional behaviors, apply didactically learned skills, and experience personal growth (Paparella-Pitzel et al., 2021). Jones et al. (2021) related that experiential learning also provides students with opportunities for mastery experiences and vicarious experiences, both sources of self-efficacy beliefs.

In PT education, full-time clinical experiences are the ideal way to foster growth in students' confidence in their clinical and professional abilities, but PT education programs have limited ability to provide students with full-time clinical experiences with all populations and in all settings (Lorio et al., 2017). Underrepresented areas within the profession, like neurologic PT, pediatric PT, and geriatric PT, present a challenge because there are not as many clinics that provide this type of PT, and the complexity of the patients is more challenging for student placements (Lorio et al., 2017). As evidence of the imbalance of physical therapy clinical experience opportunities, in 2021-2022, 78% of PT residency graduates specialized in orthopedics or sports PT, 11% specialized in neurologic PT, and 3% specialized in pediatric and geriatric PT (American Physical Therapy Association, 2023). Since more contact with realistic experiences improves clinical skills, experiential learning embedded in the didactic portion of PT education curriculum helps fill in the gaps left by limited full-time clinical experience opportunities (Lorio et al., 2017).

### ***Outcomes of Experiential Learning in Physical Therapy Education***

Research has identified many benefits to PT students associated with experiential learning activities in PT education. Positive outcomes have included opportunities for students to collaborate with professionals in their field, engage in peer-to-peer learning, enhance their problem-solving abilities, and develop their interpersonal skills (Paparella-Pitzel et al., 2021; Qutishat et al., 2021; Wolden et al., 2019). Students have also developed a sense of commitment to their community, learned about patient advocacy, and reported a sense of accountability for their learning that they did not experience in the classroom (Paparella-Pitzel et al., 2021; Qutishat et al., 2021). From the literature, four major themes emerged related to student confidence: their ability to work with particular populations, their communication skills, their professional clinical skills, and their readiness to practice in a clinical setting (Barta et al., 2022; Flowers et al., 2020; Jones et al., 2021; Lorio et al., 2017; Lowe et al., 2022; Paparella-Pitzel et al., 2021; Passmore et al., 2016; Qutishat et al., 2021; Shields & Taylor, 2014; Wolden et al., 2019).

**Improved Confidence in Working with Particular Populations.** Research shows that PT students working with patients from particular populations are associated with improved confidence in working with those populations (Barta et al., 2022; Flowers et al., 2020; Lowe et al., 2022; Qutishat et al., 2021; Shields & Taylor, 2014; Wolden et al., 2019). This is particularly true when students were previously unfamiliar with patients from those populations (Jones et al., 2021; Lorio et al., 2017; Paparella-Pitzel et al., 2021; Passmore et al., 2016; Shields & Taylor, 2014). The populations in these studies included pediatrics, older adults, low socioeconomic backgrounds, and specific diagnoses (Barta et al., 2022; Flowers et al., 2020; Lowe et al., 2022; Qutishat et al., 2021; Shields & Taylor, 2014; Wolden et al., 2019).

PT students who worked with individuals with disabilities demonstrated improved confidence in working with that population (Barta et al., 2022; Lorio et al., 2017; Shields & Taylor et al., 2014). Using a pretest-posttest design, Barta et al. (2022) found that students who participated in four laboratory sessions with individuals with neurologic disabilities demonstrated significantly improved self-perceived confidence with this group ($p<.001$). In these lab sessions, students evaluated adults and pediatric volunteers with neurologic disabilities and created plans of care. The students cited feedback from peers and experienced clinicians and processing information they gathered in real time as integral to boosting their confidence. These reports demonstrated that students received meaningful feedback and engaged with success experiences, which are defined as opportunities where they effectively accomplished a desired outcome.

Additional studies exhibited increased student confidence after experiential learning activities with individuals with cognitive and physical impairments (Lorio et al., 2017; Shields & Taylor, 2014). Lorio et al. (2017) assessed student confidence with patients with dementia. Students who participated in a multimodal learning experience that included lectures, virtual labs, and a two-hour practical experience with patients with dementia demonstrated significant improvement in empathy, understanding, and appreciation for that group on confidence and knowledge of dementia scales ($p<.001$). The researchers also found improvements in more complex scenarios, such as when patients acted inappropriately ($p<.001$) (Lorio et al., 2017). In a randomized control trial, students who developed and implemented a 10-week exercise program for individuals with Down Syndrome demonstrated improved confidence in working with individuals with that diagnosis ($p<.05$) (Shields & Taylor, 2014). Students in the control group spent time with individuals with Down Syndrome and did not provide interventions. These students also demonstrated significantly improved confidence with this population ($P<.05$).

Research reports improvement in PT student confidence with pediatric populations (Lowe et al., 2022; Wolden et al., 2019). Students who participated in clinical pediatrics visits demonstrated significant improvement from pretest to posttest on the Physical Therapy Self-Efficacy Scale (Lowe et al., 2022). The specific areas in which students demonstrated significant improvement were self-efficacy in performing examination skills, referring to other medical providers, identifying problems, and managing physical therapy problems in pediatric populations ($p=.00$). Other PT students who assisted children in an adapted exercise class demonstrated significant improvement in self-efficacy with pediatric populations measured by change in pre- to posttest on the Pediatric Communication and Handling Self-Efficacy scale ($p=.00$) (Wolden et al., 2019).

Studies have also examined student outcomes associated with participating in experiences with older adults (Dockter et al., 2020; Qutishat et al., 2021). Dockter et al. (2020) found that PT students who led exercise classes at assisted living and senior facilities and developed individual wellness plans demonstrated increased comfort in working with older adults and improved attitudes toward older adults on the Kogan’s Attitude Towards Old People Scale ($p<.001$). Additionally, these students demonstrated an increased sense of value and ability to work with geriatric populations via the Interprofessional Socialization and Valuing Scale ($p<.001$). Another group of students who prescribed community-based exercises for different age groups reported improvements in their comfort level when working with older adults (Qutishat et al., 2021). In their qualitative study using focus groups, Qutishat et al. (2021) found that initially, these students were not as willing to interact with the older clients because they saw these cases to be more complex. After the experience, the students felt more comfortable with both the challenge and the clients.

Students who participated in experiential learning with underserved populations also demonstrated positive outcomes (Passmore et al., 2016). Through analyzing semi-structured interviews, the authors found that PT students who volunteered in a student-run clinic with patients from underserved populations reported growing in their comfort and appreciation for these patients. The authors found that the students reported gaining insight into the social factors that contribute to health disparities. Moreover, students reported enhanced knowledge of social determinants of health and related community resources.

**Improved Confidence in Communication.** The literature also revealed studies that identified improved confidence in communication as a common outcome among students who participated in experiential learning. In a randomized control trial, Forbes et al. (2018a) developed a measure to assess physical therapy student self-efficacy in communication. Using a crossover design, the researchers compared students who completed patient education training sessions and then performed interviews with community volunteers with students who did not participate in training sessions first. The training sessions included patient observations via video, simulated practice situations, and targeted feedback after. They found a significant difference between the groups on communication self-efficacy scores and competency skills ($p<.05$). The training group students engaged with success experiences in executing competency skills, participated in modeling experiences through video observation and simulated situations, and received specific feedback from instructors (Forbes et al., 2018a). Wolden et al. (2019) also measured physical therapy student self-efficacy in communication. After PT students interacted verbally with the pediatric participants, students demonstrated significantly increased perceived self-efficacy in communication (p=.00). The two areas in which students gained the greatest increases were communicating with children who were non-verbal and communicating with a child's family.

In a sequential mixed methods study, Gustafsson et al. (2016) found that students who worked in an interprofessional student-led clinic as part of a rehabilitation intervention reported increased confidence in communicating with other health professionals. Another study found that students who participated in a student-run physical therapy clinic that included supervision from professional physical therapists reported improvements in several areas of communication (Paparella-Pitzel et al., 2021). As measured on open-ended survey questions, researchers found that students reported gains in confidence in interactions with patients, the ability to communicate with patients and fellow students, and their personal communication skills.

In their analysis of interviews, Passmore et al. (2016) found that students who worked in an interdisciplinary clinic for patients with health disparities reported an increased ability to communicate with students from other disciplines. They reported that this enabled them to work toward a mutual goal with students from other areas of healthcare and provide healthcare to patients in need in a realistic setting. Students also reported that they learned from one another through communicating with them. These studies offered robust opportunities for students to interact with one another verbally, providing verbal feedback to one another, and alongside one another, fostering vicarious and modeling experiences.

**Improved Confidence in Professional Clinical Skills.** Experiential learning also offers PT students opportunities to practice and refine their professional clinical skills beyond communication in realistic and clinical scenarios. The ANPT includes using tests and measures, performing movement analyses, synthesizing examination and evaluation data, and designing and instituting evidence-based interventions as essential clinical skill competencies for entry-level neurologic physical therapy practice (Bradford et al., 2023).

The literature includes studies that assessed students' examination skills and confidence in those skills after experiential learning (Paparella-Pitzel et al., 2021; Paul et al., 2022). Students who completed a fall risk training session and then instituted an examination with older adults demonstrated significant improvement in their examination skills (Paul et al., 2022). Through their pretest-posttest design, the researchers examined students’ confidence in examination skills via a questionnaire and found that students demonstrated significant improvement in confidence in interview skills and in performing two specific patient mobility tests ($p=.001$, $p=.011$, $p=.046$). Additionally, the students were found to be reliable ($ICC>.9$) when compared to the faculty evaluators on six out of seven clinical tests. Students who participated in a student-run PT clinic with professional PT supervisors reported that their confidence in their examination skills improved (Paparella-Pitzel et al., 2021). This mixed methods study found significant improvements in their knowledge of assessment tools, outcome tools, and how to use a supervisor in patient care ($p<.001$, $p=.007$, $p=.006$). The students reported via open-ended questions that they felt they were using the skills they had learned in the classroom in a real environment.

Studies also have highlighted improvements in evaluation and synthesis skills in students after engaging in experiential learning (Dockter et al., 2020; Ingram et al., 2019). Ingram et al. (2019) studied professional physical therapists’ experiences working with patients who required pain management services using a mixed methods design. In semi-structured interviews, the physical therapists reported that they had low confidence in assessing and synthesizing patient evaluations if they had not practiced in that clinical area. They also reported that if they had received practical and clinic-based learning in pain management as students they had improved confidence. Dockter et al. (2020) found that PT students who led exercise programs in senior facilities and provided individualized wellness plans to those clients demonstrated significant increases in comfort in completing evaluations with other healthcare professionals via the Interprofessional Socialization and Valuing Scale ($p<.001$).

Other studies investigated students' confidence in providing interventions to clients in experiential learning activities (Qutishat et al., 2021; Shields & Taylor, 2014; Wolden et al., 2019). Students who led small-group community-based exercise interventions reported in focus groups that they gained improved confidence in prescribing exercise after their experience (Qutishat et al., 2021). Furthermore, these students reported that they had limited resources and reported that they had improved creativity and innovation in prescribing exercises because of this experience. Other students who led a 10-week exercise program with individuals with Down Syndrome demonstrated improved exercise intervention delivery via a self-rated competency of professional behaviors measure ($p<.05$) (Shields & Taylor, 2014). Wolden et al. (2019) examined students using a pediatric communication and handling self-efficacy scale and found that students who assisted in an adapted pediatric fitness class felt significantly more confident in their ability to perform patient handling, calm a child, perform transfers, and guard patients to prevent injuries ($p=.001$). In this study, students were supervised by professional physical therapists and were given immediate feedback.

**Improved Confidence in Readiness to Practice in a Clinical Setting.** A common outcome that emerged from the body of literature on experiential learning in PT education is students' confidence in their readiness to practice in a clinical setting. This aligns with one statement from Van Lankveld et al.'s (2017) measure, the Physiotherapy Self-Efficacy questionnaire (PSE), which asserts that confidence in preparedness is an integral part of determining overall readiness to undertake a caseload. In Jones and Sheppard's (2012) original version of this measure, each statement asked students to rate how confident they were in their preparedness in each key area. This showed that students' feelings of readiness were a key component of their preparation for clinical practice. The ANPT does not provide a target to help determine to what extent a PT student should feel prepared for clinical practice, but they assert that it is the responsibility of educators to prepare students (Bradford et al., 2023).

Studies show that students report common aspects of readiness for professional practice in which they feel more confident, including understanding social responsibility, professional identity, and professional accountability (Lorio et al., 2017; Qutishat et al., 2021; Stickler et al., 2013). Students who participated in a multi-modal activity in which they engaged in classroom learning, a virtual experience, and a clinical experience with a patient with dementia showed improved confidence in understanding the challenges and social needs of their clients via confidence and knowledge of dementia scales ($p<.025$) (Lorio et al., 2017). This experience was followed by a debriefing and book club activity which provided an opportunity for reflection. Students who led small group community-based exercises reported an increased sense of professional identity (Qutishat et al., 2021). In focus groups, Stickler et al. (2013) found that students who worked in a community-based pro bono clinic reported confidence in their sense of preparedness to be socially responsible for their patients and grew in their understanding of professional accountability.

Other researchers report that students feel more confident in their readiness for employment after experiential learning activities (Flowers et al., 2020; Shields & Taylor, 2014). After implementing exercise programs with individuals with Down Syndrome for 10 weeks, a group of students felt that they had an improved skill set for employment as measured by a self-rated competency in professional behaviors scale ($p<.05$) (Shields & Taylor, 2014). Flowers et al. (2020) explored whether the amount of pediatric clinical experiential learning activities in which PT students participated influenced the student outcomes from those experiences. In their pretest-posttest comparison group study, they compared a high-dose group, who completed 15 hours, to a low-dose group, who completed three hours. On the Physical Therapy Self-Efficacy Scale and the Health Science Reasoning Test, the high-dose group demonstrated significantly larger changes in clinical reasoning and self-efficacy ($p=.00$, $p=.00$). Both the high- and low-dose groups showed significant improvement in critical thinking skills ($p=.00$). Clinical reasoning has been associated with confidence in clinical practice and is a desired outcome for PT students and professional physical therapists (Barta et al., 2022). Therefore, this significant improvement in clinical reasoning demonstrated an increased readiness for professional PT practice. The body of research on experiential learning in PT education demonstrates mainly positive outcomes in student development and learning, particularly in the areas of confidence in professional behaviors and skills.

### ***Characteristics of the PT Experiential Learning Literature***

The literature on experiential learning in PT education is characterized by variability in design, setting, and rigor of research (Schreiber et al., 2015). Study designs have included quantitative methods of measuring student outcomes after experiential learning activities (Barta et al., 2022; Dockter et al., 2020; Flowers et al., 2020; Forbes et al., 2018a; Lorio et al., 2017; Paul et al., 2022; Wolden et al., 2019). Other studies used mixed methods sequential designs, first employing quantitative methods to objectively measure student responses associated with experiential learning and qualitative analyses to explain data (Gustafsson et al., 2016; Ingram et al., 2019; Paparella-Pitzel et al., 2021; Shields & Taylor, 2014). Additionally, some researchers assessed student reports after experiential learning through qualitative designs like focus groups, semi-structured interviews, and open-ended survey questions (Passmore et al., 2016; Qutishat et al., 2021; Stickler et al., 2013).

In addition to the research design differences, the literature also varies in the setting and application of the experiential learning activity. None of the experiential learning in PT education studies was exclusively conducted within a classroom setting; rather, some began with classroom lectures or activities before incorporating other experiential components (Forbes et al., 2018a; Lorio et al., 2017; Wolden et al., 2019). In these studies, students engaged in classroom lectures and then preparatory activities, sometimes using web-based platforms, before putting their knowledge into practice within realistic community settings (Lorio et al., 2017; Wolden et al., 2019). Forbes et al. (2018a) centered their study in a laboratory setting and trained students who then subsequently applied communication techniques with participants recruited as actors from the general community. Barta et al. (2022) examined students who participated in four laboratory sessions where they evaluated adult and pediatric community members (Barta et al., 2022). These studies did not align with a typical classroom-based approach and did not occur in an outside-the-classroom or community setting.

Most studies were conducted in settings outside of the classroom. Common educational activities implemented and studied included examining students who participated in clinic observations followed by practical experiences that incorporated reflection activities integral to experiential learning (Flowers et al., 2020; Lowe et al., 2022). Some researchers investigated student outcomes after activities in which they designed and led exercise programs in the community across age spans and community settings (Dockter et al., 2020; Qutishat et al., 2021;

Shields & Taylor, 2014). Other researchers examined students who participated in community-based clinics where students evaluated patients and provided care services (Gustafsson et al., 2016; Paparella-Pitzel et al., 2021; Passmore et al., 2016; Stickler et al., 2013).

A fundamental responsibility of PT education programs is to equip students to be ready to meet the challenges of clinical practice (Bradford et al., 2023; Van Lankveld et al., 2017). PT students have demonstrated greater competence in clinical settings when they feel well-prepared and confident to apply their learning. The preceding studies exhibited examples of PT education approaches that have implemented experiential learning activities and illustrated success in improving students' feelings of readiness and confidence to meet those challenges.

### *Experiential Learning Theory*

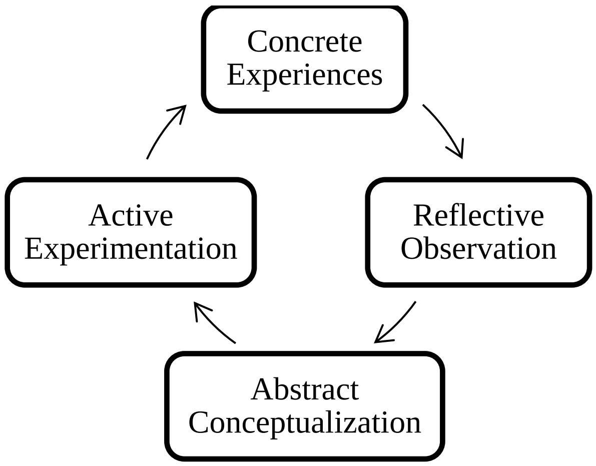
PT education programs have begun employing a broader range of educational approaches to promote students' professional skills more effectively through experiential learning. Beyond technical proficiency and knowledge, PT education programs are responsible for ensuring their students cultivate the softer skills of professional practice (CAPTE, 2023). Teaching these skills, such as communication and attitudes, is more challenging to teach in a classroom setting (Qutishat et al., 2021). Moreover, PT education programs are responsible for teaching students to apply technical skills and professional behaviors across a variety of practice areas, patient populations, and patient ages (CAPTE, 2023). These behaviors and skills are best learned through practical experiences and reflection practices, integral components of educational approaches informed by evidence-based theories like experiential learning theory.

The theory of experiential learning posits that learning occurs through processing an experience rather than the experience itself (Kolb et al., 2001). Experiential learning is an integrated approach to learning that acknowledges that individuals learn through adapting to their physical and social surroundings (Kolb, 1984). Experience encompasses both one’s internal emotions or subjective state and the objective environment surrounding them. Furthermore, it emphasizes that learning is a transformation rather than an outcome and that learning is continuous rather than attained (Kolb, 1984). Kolb et al. (2001) assert that there are two types of experiences individuals must process to learn: grasping and transforming.

These two types of experiences facilitate a cycle of learning that is promoted through four abilities in the experiential learning process (Kolb, 1984). The four abilities are concrete experiences, reflective observation, abstract conceptualization, and active experimentation. Grasping experiences are either concrete or abstract (Figure 1). Concrete experiences require individuals to immerse themselves fully in their environment and rely on their senses to perceive and understand what is happening (Kolb, 1984; Kolb et al., 2014). In PT experiential learning, concrete experiences occur when students are embedded in laboratory experiences, especially with patients or community members; clinical scenarios with patients; or in community exercise experiences (Barta et al., 2022; Dockter et al., 2020; Lorio et al., 2017; Lowe at al., 2022). In these settings, PT students engage with—through their senses—the nuances, and practical experiences of interacting with clients and patients in outside-the-classroom environments.

**Figure 1**

*The Cycle of Experiential Learning*




*Note.* This figure demonstrates the four abilities of the cycle of experiential learning (Kolb et al, 2014).

In contrast to sensing or feeling during a concrete experience, abstract conceptualization necessitates that individuals make sense of their observations by thinking about what they have sensed, analyzing this, and planning for future action accordingly. In PT experiential education, abstract conceptualization occurs when students observe, analyze, and plan through multi-modal experiences or training experiences followed by practical application labs (Forbes et al., 2018a; Lorio et al., 2017; Paul et al., 2022). When PT students engage with training and observations first, then are prompted or given time to analyze and plan for the subsequent steps of their activity, they experience abstract conceptualization.

Transforming experiences rely on observation, reflection, and experimentation. The first ability that supports transforming experiences is reflective observation (Kolb, 1984; Kolb et al., 2014). Reflective observation requires learners to observe others, reflect on what they see, and do this from more than one perspective if possible. In PT experiential education, opportunities for reflection occur when the experiences incorporate feedback from supervising physical therapists, peer feedback, and require reflection assignments (Lorio et al., 2017; Passmore et al., 2016; Paparella-Pitzel et al., 2021; Wolden et al., 2019). PT students who receive and process peer and supervisor feedback and provide self-feedback through reflection activities are engaging with reflective observation.

An additional ability in transforming experiences is active experimentation (Kolb, 1984; Kolb et al., 2014). In active experimentation, individuals fully immerse themselves in their environment and apply the concepts they have gathered to make decisions and solve problems. In PT experiential education, students are provided opportunities for active experimentation when they design exercise programs for clients, execute examinations and evaluations, and work as part of a multi-disciplinary team to provide patient care (Gustafsson et al., 2016; Qutishat et al., 2021; Shields & Taylor, 2014; Wolden et al., 2019). In active experimentation, PT students work through and solve problems and engage in trial-and-error learning.

Grasping and transforming experiences require learners to be both fully engaged and objectively distant (Kolb et al., 1984). Learners will engage with each of the four abilities differently, and a learner’s approach is related to the task they are performing and the context in which they are performing it. Experiential learning theory recognizes that solving problems and completing tasks requires a set of skills for successful completion. Experiential learning offers a cycle of these four abilities to foster individuals learning these skills (Kolb et al., 2014). This cycle is often present in PT experiential education opportunities, and these activities may promote the cycle continuously or in a spiral nature.

This cycle first engages an individual through concrete experiences (Kolb et al., 2014). Next, the individual reflects on what they observed during their concrete experiences, ideally from multiple perspectives. During abstract conceptualization, the individual creates internal theories and ideas to process what they have sensed and reflected upon. Last, the individual uses the outcomes of this analysis to actively solve problems and engage more fully in their environment. When carried out with an educational intention, experiential learning allows students to explore and develop professional identities and work roles they will need in their future professions (Flowers et al., 2020).

Promoting the four abilities in experiential learning sets it apart from other educational approaches, like volunteerism and service learning (Stickler et al., 2013). Instead, it uses a structured approach that is connected to student learning objectives and involves preparation and reflection (Lowe et al., 2022). This structured approach can be designed to foster learning psychomotor skills, metacognition, communication, and professional attitudes (Flowers et al., 2020). In the area of PT education, instructors have specifically targeted teaching clinical reasoning, professional identity, communication, and critical thinking, while hoping to positively impact self-efficacy, self-confidence, and motivation (Flowers et al., 2020; Lowe et al., 2022; Schreiber et al., 2015). Furthermore, PT educators have used experiential learning to increase student contact with specific skills and particular populations (Lowe et al., 2022). Overall, experiential learning in PT education programs is associated with improved confidence in their professional skills and behaviors.

**Influencing Self-Efficacy in Physical Therapy Education**

The common outcomes observed in the PT experiential education literature were confidence in four areas of practicing as a physical therapist: confidence with particular populations, confidence in communication, confidence in professional clinical skills, and confidence in readiness to practice physical therapy. A measure of confidence in one’s ability to carry out a skill is self-efficacy. Whereas *confidence* is the strength of one's belief, *self-efficacy* is an individual's belief that they can carry out a specific task (Bandura, 1997).

Self-efficacy beliefs are context and task-specific (Bandura, 1997). Van Lankveld et al. (2017) supported this finding by demonstrating that measuring self-efficacy is clinical area specific. To improve self-efficacy in PT students, instructional activities should consider self-efficacy belief sources and concepts of self-efficacy theory to develop methods that support those sources of beliefs and concepts (Bandura, 1997). As a result, approaches to instruction intending to influence students' self-efficacy in clinical and professional skills should also be clinical area-specific.

Clinically, self-efficacy cannot replace knowledge, but it empowers physical therapists and students to confidently make decisions independently (Paul et al., 2022). Physical therapists have reported that they hesitate to perform specific skills when they are inexperienced, lack comprehensive training, or have low self-efficacy (Forbes et al., 2018a). Moreover, they report that their most influential training experiences have been observation, rehearsal, direct clinical practice, and feedback within those experiences. Recent PT graduates have attributed their most influential source of self-efficacy to being directly exposed to specific practice in clinical settings (Jones et al., 2021). They cited practicing communication in real-world situations and observing others perform their roles as two strong influences on their confidence in their clinical abilities.

In a meta-analysis, Robbins et al. (2004) found that self-efficacy predicts training performance, transfer of skills, job performance, and job satisfaction. Furthermore, they found that the mode of instruction is related to students' ability to learn content and perform clinical and professional skills. Using well-designed instructional practices that incorporate self-efficacy belief sources and are specific to a task and clinical area may produce not only improved self-efficacy but also broader positive outcomes in one's vocation.

### *Self-Efficacy Theory*

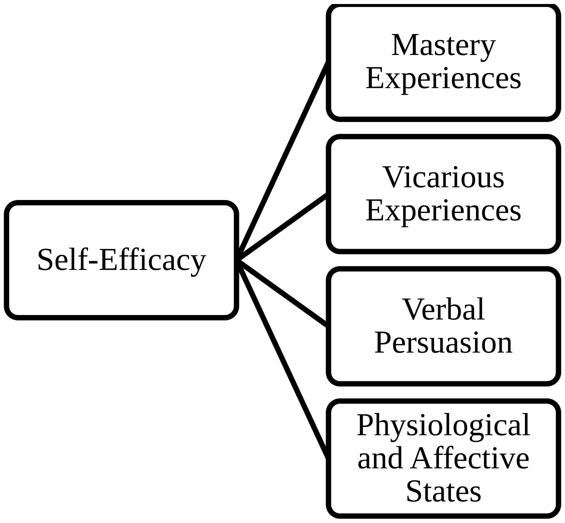
Self-efficacy is vital to student development because it ensures students feel confident to practice with independence and skill (Van Lankveld et al., 2017). It is positively related to achievement, performance, and effort in academic settings (Robbins et al., 2004). Additionally, it predicts physical therapy students' clinical performance (Jones et al., 2021). In general, those with lower self-efficacy may avoid doing or persisting in a task, and those with higher self-efficacy will persist in or give more effort to a task (Jones et al., 2021).

Self-efficacy theory purports that individuals must believe that they possess enough knowledge and skill to produce an expected or desired outcome (Bandura, 1977). Therefore, to accomplish a task, an individual must have the knowledge, skill, and self-efficacy to do so. As a result, an individual's self-efficacy beliefs influence how they approach and persist in a task (Bandura, 1997). Furthermore, it affects that individual's motivation, effort, participation, and how they respond to any difficulties they face while completing that task (Jones et al., 2021).

In his work on self-efficacy theory, Albert Bandura (1977) posited that what one thinks about their capabilities does not always determine the success of their performance on a task but begins to influence their performance when they cognitively process and reflect on their performance. He found four constructs (see Figure 2) encompassing the four primary sources of self-efficacy beliefs: mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states (Bandura, 1997).

**Figure 2**

*The Four Constructs of Self-Efficacy*




*Note.* This figure displays the four sources of self-efficacy beliefs (Bandura, 1997).

***Sources of Self-Efficacy Beliefs***

**Mastery Experiences.** Mastery experiences are the most influential source of self-efficacy beliefs and are the most predictive of whether an individual will succeed in a task (Bandura, 1997). Mastery experiences are engaging with successes in a particular task. Students develop stronger self-efficacy when they have direct and specific exposures to successfully performing a task. Developing self-efficacy because of successes does not come from the successes themselves but from one cognitively processing what the performance means about themselves (Bandura, 1997). As one practices and performs a task, an individual may apply self-assurance and cognitive effort to complete that task. Adversity does not sabotage this process but presents individuals with the opportunity to persevere and overcome obstacles, further strengthening their efficacy beliefs.

Experiencing multiple successful performances strengthens self-efficacy (Bandura, 1977). Individually, these can be expressed as success experiences, and multiple success experiences lead to increased mastery of a skill or behavior. Repeated failures and lack of exposure to a task decrease one's ability to succeed and may weaken self-efficacy. In their mixed methods study of student self-efficacy in patient education, Forbes et al. (2018b) found that PT recent graduates who reported experiencing successes demonstrated significantly higher self-efficacy than those who did not ($p=.003$).

**Vicarious Experiences.** Vicarious experiences are behaviors that are modeled for an individual (Bandura, 1977). When individuals observe others successfully perform a task, they develop beliefs about their own ability to perform similar tasks, assessing themselves based on the observed abilities of others. This source of self-efficacy is especially strong when the individual identifies with the person they are observing and if this is a novel task to the observer. If the observer outperforms a modeled behavior, this increases self-efficacy beliefs (Bandura, 1997). Conversely, being outperformed by modeled behavior lowers self-efficacy beliefs. PT students who participated in an interprofessional case-based experience were found to have significantly improved self-efficacy via the Self-Efficacy for Interprofessional Learning survey ($p<.05$) and reported that this was due to planning and performing their interventions and examinations as part of a group (Ivey et al., 2018). The students were able to observe others and grow in their confidence in their ability to carry out the intervention as a result.

**Verbal Persuasion**. Verbal persuasion occurs in the form of verbal feedback or body language (Bandura, 1997). When an observer delivers positive or constructive feedback, the recipient feels a sense of trust from that observer rather than doubt. This feeling of trust from an observer proceeds to influence the performer to give and sustain increased effort toward their task. An individual's efficacy beliefs are strengthened if they already possess some confidence in their ability. Moreover, if the individual giving feedback is influential or knowledgeable about a skill or task, their feedback strengthens efficacy beliefs to a greater extent (Bandura, 1997). Forbes et al. (2018b) demonstrated that students who reported receiving feedback in their experiential learning activity exhibited significantly higher self-efficacy in their communication skills than those who did not (p=.04).

**Physiological and Affective States.** When an individual performs a task, they experience somatic, or physiologic, and emotional, or affective, responses that influence this individual's judgment of their abilities (Bandura, 1997). These responses may be negative or positive and affect one's self-efficacy accordingly. Performers learn to interpret their body's reactions through repeated exposures to those responses. Individuals can mitigate the negative effects of stress reactions by improving their physical and cognitive preparedness for performance, reducing their stress levels during performance, and learning to correctly interpret their body's responses (Bandura, 1997). In their mixed methods study, Ferreira et al. (2020) found that students reported that if they had experienced stressful emotions in a previous learning experience, they were more capable of their confidence in learning in subsequent experiences because they had learned to cope with these feelings in their prior experience.

***Measuring Self-Efficacy in Physical Therapy Students***

One approach to influencing self-efficacy in PT students is to assess student levels of self-efficacy (Jones & Sheppard, 2012). Using measures to determine students' levels of confidence in their clinical and professional abilities enables instructors to identify areas of strength and weakness in their students, develop individual and class-wide plans of study to address those areas, and ultimately prepare students for more successful clinical experiences. This may enable students with low self-efficacy to receive additional support and experience to prepare them for clinical placements. Additionally, assessing self-efficacy beliefs in students may evaluate how instructional methods affect student self-efficacy (Jones & Sheppard, 2012). Reliable methods of assessing student self-efficacy allow instructors to compare educational approaches, compare student preparedness for clinical practice, and promote evidence-based practice with the broader PT profession (Van Lankveld et al., 2017).

**Physiotherapy Self-Efficacy Questionnaire (PSE).** The Physiotherapy Self-Efficacy (PSE) Questionnaire was first developed to assess physical therapy self-efficacy in acute care practice (Jones & Sheppard, 2012). Using curriculum standards set by the Australian Physiotherapy Council as their guide, they identified thirteen key areas of physical therapy practice and patient management about which they developed self-efficacy statements. Researchers then studied the PSE and found, as Bandura purported, that self-efficacy is context-specific (Bandura, 1997; Van Lankveld et al., 2017). As a result, they developed a 39-item PSE questionnaire that contained three practice domains, including musculoskeletal, neurologic, and cardiorespiratory. Therefore, the resulting PSE questionnaire contained thirteen questions for the corresponding domains in each subscale. Van Lankveld et al. (2017) found the measure to be reliable and valid in measuring PT self-efficacy in these specific areas of practice, citing its high internal consistency (Cronbach's Alpha = .97), excellent test-retest reliability (ICC = .80), and statistical significance in responsiveness ($p<.01$). Additionally, they found a significant relationship between student self-efficacy beliefs and specific clinical areas ($p<.01$) and a weak association between student self-efficacy beliefs and general practice concepts in PT (Van Lankveld et al., 2017). Various studies have used the PSE to measure self-efficacy in PT students across multiple areas of practice (Massey et al., 2023; Shavit et al., 2023; Tilson et al., 2022; Van Lankveld et al., 2019).

**Physical Therapist Self-Efficacy Scale (PTSE).** Venskus and Craig (2017) developed the PTSE to measure confidence in specific functions of PT practice. Their goal was to capture self-efficacy in the professional skills and behaviors of physical therapy clinical reasoning and modeled the instrument after the General Pediatric Self-Efficacy (GSE) scale. This scale was not specific to clinical areas of practice. Venskus and Craig established validity in their five-item scale and showed that it measured significant changes in self-efficacy in first to second and second to third year PT students ($p=.00$, $p=.00$). The PTSE has been used to measure self-efficacy in performing a telehealth PT examination, changes in self-efficacy after pediatric experiential learning, and in comparing clinical education outcomes in students (Campbell et al., 2023a; Campbell et al., 2023b; Lowe et al., 2022).

**Self-Efficacy of Physical Therapist Student Outcomes (SEPTSO).** Stickley et al. (2019) developed a 25-item self-efficacy scale that measures student self-efficacy related to expected student outcomes established by CAPTE standards. The three main categories in the measure are communication, competence in patient care, and professional responsibilities. They found the tool to be valid, demonstrating significant changes over time between student cohorts ($p<.05$). Additionally, it was found to have excellent internal reliability (Cronbach's alpha = .983). Though this measure demonstrates sound psychometric properties, it has not been used in additional studies in the literature.

## Gaps in the Literature

The literature exhibits positive student outcomes after experiential learning, including significant objective student-reported increases in confidence in physical therapy clinical skills and professional behaviors. Additionally, the experiential learning activities leading to these positive outcomes contained elements that supported the sources of self-efficacy beliefs, including mastery experiences, vicarious experiences, verbal persuasion, and physiologic and affective states (Bandura, 1997). However, no research in the literature has directly investigated the thirteen individual self-efficacy statements, or clinical subscales, defined by the PSE in students after PT experiential learning activities. Some studies used the total score on the PSE to assess physical therapy self-efficacy but have not considered individual items or clinical areas from within the scale (Massey et al., 2023; Shavit et al., 2022; Tilson et al., 2022; Van Lankveld et al., 2019).

It is important to determine whether a significant association exists between experiential learning and physical therapy student self-efficacy with the specific population of patients with neurologic disorders. Studies have demonstrated general improvements in self-efficacy or confidence in students who participated in experiential learning activities with a limited scope of specific populations, including individuals with dementia, Down Syndrome, and pediatric patients (Flowers et al., 2020; Lorio et al., 2017; Schreiber et al., 2015; Shields & Taylor, 2014; Wolden et al., 2019). Research has not yet specifically examined whether this relationship exists for students who engage in experiential learning with adults with neurologic diagnoses. Therefore, there is a gap in the literature that investigates the impact of experiential learning, particularly outside of the classroom and laboratory, with adults with neurologic disorders on physical therapy student self-efficacy with working with this population.

While the literature demonstrates promising experiential learning outcomes in PT education, its generalizability to all PT education programs may be limited. For instance, all the studies were conducted at single research sites, each representing the unique population of students at their institution. Additionally, many studies used qualitative methods to identify outcomes among PT students, which may potentially be more challenging to replicate or compare to quantitative studies. Other studies used instruments that lacked well-established validity and reliability in the literature (Gustafsson et al., 2016; Lorio et al., 2017). Furthermore, much of the research focused on students engaged in volunteer opportunities, potentially biasing the data as these students may possess a higher level of confidence to volunteer for such activities (Paparella-Pitzel et al., 2021; Passmore et al., 2016; Stickler et al., 2013). Additionally, comparing these studies is challenging due to variations in curricular design and sequencing among PT education programs.

There is a lack of research regarding a measurable relationship between PT students engaging in experiential learning with neurologic populations and their self-efficacy with this population. The body of evidence that studies PT students who have participated in experiential learning opportunities demonstrates common outcomes that are related to developing self-efficacy with specific populations, including confidence in communication, confidence in professional clinical skills, and confidence in readiness for physical therapy practice.

Further research is needed to establish a clear relationship between PT students' participation in experiential learning activities with neurologic populations and their self-efficacy with this population. Integrating the principles of experiential learning theory into research procedures will help establish an evidence-informed approach to study designs. Moreover, employing reliable and valid instruments consistent with the principles of self-efficacy theory is essential. Additionally, triangulated data from student-reported reflections should provide further insights into student self-efficacy outcomes. These approaches are important for understanding the impact and effectiveness of PT student education in meeting the complex and growing needs of individuals with neurologic disorders.

# Chapter Three: Methods

## Study Design

The study used a sequential-explanatory mixed methods research design to examine the relationship between Doctor of Physical Therapy (DPT) student participation in an experiential learning activity with individuals with neurologic disorders and self-efficacy with this population. This study sought to determine if DPT students experienced significantly greater changes in self-efficacy after participating in an experiential learning activity than when they did not participate in experiential education. The independent variables included 1) participation in an experiential learning activity with individuals with neurologic disorders, and 2) engagement with success experiences during the experiential learning activity. The dependent variables included changes in neurologic physical therapy self-efficacy total scores and sub-scores.

## Study Overview

A quantitative analysis was conducted using a quasi-experimental, repeated measures design. By using a repeated measures approach, the study investigated data collected from one group of students beginning in the summer 2023 semester, during which students did not participate in the experiential learning activity, followed by two semesters—fall 2023 and spring 2024—during which students did participate in the intervention. Since the study occurred over three semesters, this design allowed the group to become its own control group (Creswell, 2005). As part of a consecutive three-semester series of neuromuscular rehabilitation courses, the researcher measured the students' self-efficacy via pretests and posttests using the Physiotherapy Self-Efficacy (PSE) questionnaire during the second year of their DPT education (Van Lankveld et al., 2017).

***Study Participants***

Thirty-two second-year DPT students from Mary Baldwin University (MBU) were recruited for this study using a convenience sampling method. Data was collected as part of the MBU DPT curriculum from the summer 2023 semester through the spring 2024 semester. Due to incomplete survey responses from three participants and one participant not finishing the third course in the series, the final sample size was 28. According to Faul et al. (2009), when using G*Power analysis tool (https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower), a sample size of 10 is sufficient for a repeated measures ANOVA with 80% power, 0.5 effect size, and $\alpha = .05$.

**Inclusion and Exclusion**. Participants must have been enrolled in all three semesters of their second year of education at MBU during the 2023-2024 academic year. Students must have completed NeuroWellness through the neuromuscular rehabilitation courses. Participants must have completed informed consent. Students who did not complete all three academic semesters or NeuroWellness were not included in the study. Participants must have been able to access and complete an electronic questionnaire independently.

***Instrumentation***

**The Physiotherapy Self-Efficacy Questionnaire.** To measure student self-efficacy with neurologic populations, participants completed the PSE neurology subscale questionnaire (Appendix A) (Van Lankveld et al., 2017). Permission was obtained from both Van Lankveld (2017) and Jones (2012) to use the neurologic subscale for this study (Appendix B). The PSE neurology subscale contains 13 key statements about which students indicate their confidence on a Likert scale (Van Lankveld et al., 2017). On the questionnaire, level of confidence for each statement is measured on a scale of one (not confident at all) to five (very confident). A sum of the scores on the 13 key statements indicates a student's total self-efficacy with a neurologic caseload. The maximum score an individual can respond is 65, corresponding to feeling "very confident" on all 13 statements.

To develop the PSE, Jones and Sheppard (2012) studied the relationship between academic readiness and self-efficacy during the clinical preparation of physical therapy students. They recognized a need for a survey that measured task- and context-specific self-efficacy that mirrored Bandura's (1977) principle that self-efficacy is context- or situation-specific. As a result, they developed a questionnaire for physical therapy students to measure their self-efficacy after educational experiences that included constructs of self-efficacy, such as modeling, feedback, and task-specific practice (Jones & Sheppard, 2012).

Researchers adapted this questionnaire to measure total self-efficacy in physical therapy students and self-efficacy in three specific domains, including neurological, musculoskeletal, and cardiorespiratory caseloads (Van Lankveld et al., 2017). Van Lankveld et al. (2017) found a strong relationship between situation-specific items and self-efficacy that agreed with Bandura's (1977) principles of self-efficacy. They also found that this scale was effective in measuring student self-efficacy in practicing in clinical-specific areas, including neurology (Van Lankveld et al., 2017). Additionally, they found that it was useful in determining the effectiveness of education methods in teaching PT students, like modeling and high-fidelity practice.

Van Lankveld et al. (2017) established significant construct validity for the thirteen items on the neurological subscale of the PSE, high internal consistency (Cronbach's Alpha = .97), excellent test-retest reliability (ICC = .80), and statistical significance in responsiveness ($p<.01$). Researchers have used the PSE questionnaire to successfully measure PT self-efficacy in studies of physical therapists working with patients with low back pain, assess student self-efficacy with applying clinical rules, evaluate PT self-efficacy with a specific neurological diagnosis, and measure changes in PT student self-efficacy in relationship to self-directed learning (Massey et al., 2023; Shavit et al., 2022; Tilson et al., 2022; Van Lankveld et al., 2019).

Through analyzing the 13 statements on the neurologic PSE for common themes related to domains of PT practice, this current study consolidated the 13 key statements into five areas of PT practice. These five areas include feelings of preparedness, verbal and written communication, examination skills, synthesis and evaluation skills, and intervention skills. The sum of the scores in each of these five areas will indicate a student's self-efficacy sub-score in that common area of physical therapy practice. This current study seeks to examine student self-efficacy after this experiential education activity in these specific areas of clinical practice, aligning with Bandura's (1977) principle that self-efficacy is context-specific.

**Narrative Reflection Questions.** Based on reflective practices found in the literature that align with the experiential learning theory construct of reflective observation, a set of five questions was developed for this study (Appendix C) to obtain narrative reflections from participants on their experiential learning activity (Kolb et al., 2001; Ryder & Downs, 2022). The first two questions asked participants to report their encounters in the activity by prompting them to reflect on the "what" or the descriptive-level reflection of their experience (Ryder & Downs, 2022). The second two questions asked participants to report on the "so what" or the theory-and-knowledge-building reflection of their experience. The fifth question asked participants to report the "now what" or the action-oriented reflection of their experience (Ryder & Downs, 2022).

**Success Experience Survey.** To examine whether student self-efficacy was related to the self-efficacy construct of mastery—or success—experiences, the students completed a brief survey about their client's improvement across two semesters of NeuroWellness (Bandura, 1977). The survey contained one question that asked students to indicate the total number of clients who demonstrated one or more positive measurable changes on the outcome measures the students performed during NeuroWellness.

***Description of Experiential Learning Intervention***

As part of the MBU DPT standard neuromuscular rehabilitation curriculum, students enrolled in the DPT program completed the first of three semesters of didactic neuromuscular rehabilitation education during summer 2023. Students did not participate in NeuroWellness during the first semester.

During the second semester (fall 2023) students participated in four consecutive weeks of NeuroWellness. Student participants worked individually or in pairs and were assigned to one client for each one-hour session. They completed four one-hour sessions with each of their two clients, totaling eight hours of NeuroWellness. During the first session with each client, students instituted examinations or re-examinations. At each subsequent visit, students implemented exercise plans that they developed based on the examination and client goals. Students were supervised by one to two licensed physical therapists, including their instructor who was also the researcher for this project. Additionally, students were assisted by certified personal trainers at the Staunton-August YMCA (SAYMCA).

In groups of four, students completed a written and oral case report presentation on one NeuroWellness client. A case report typically includes the findings of and research-based evidence for the client examination and evaluation, interventions, and outcomes. Additionally, students completed a brief reflection on what contributed to their client’s success or lack of success as defined by improvement or lack of improvement on measured outcomes.

During the third semester (spring 2024), students were enrolled in didactic education and four weeks of NeuroWellness. Students were assigned in pairs or as individuals to clients in the program and worked with those clients for four consecutive weeks, for a total of eight hours of NeuroWellness. Therefore, participants completed a total of 16 hours at NeuroWellness. This “dose”—the amount of time the students spent actively participating in the learning experience—of the experiential learning activity aligned with the dosing Flowers et al. (2020) determined was related to increased self-efficacy.

During the third semester, students did not conduct a formal examination but measured any identified impairments or items of function that pertained to clients’ goals. Additionally, the students completed an evidence-based practice project. This project included identifying a patient problem, creating a clinical question to solve that problem, performing a literature search, composing a clinical commentary on a selected scholarly article, reporting on the institution of their solution to the patient problem, and then reflecting on the experience.

***Data Collection***

All data was collected electronically using Microsoft Forms (https://forms.office.com). Links to the web-based questionnaires were posted in the class modules on the learning management system (https://www.instructure.com/canvas) for the corresponding weeks. An announcement was posted at the beginning of the week to remind students to complete the surveys. Only students enrolled in the courses had access to the Canvas page and questionnaires.

Before completing the first pretest, participants provided informed consent during the summer 2023 semester (Appendix D). Students completed the PSE questionnaire pretests in week two of summer 2023 and in week three of both the second and third semesters (see Table 1). Students completed PSE questionnaire posttests in the final week of the summer 2023 semester and in the second to last week of the fall and spring semesters. Additionally, participants completed the Client Experiences survey in the last week of the spring 2024 semester. Qualitative data was collected via written student narrative reflections (Appendix B) posted as an assignment in Canvas in the final week of the spring 2024 semester.

**Table 1**

*Data Collection Timeline*

| Semester | Date | Procedure |
|---|---|---|
| Summer 2023 | June 2023 (Week 2) | PSE Pretest 1 |
| Summer 2023 | August 2023 (Week 9) | PSE Posttest 1 |
| Fall 2023 | September 2023 (Week 3) | PSE Pretest 2 |
| Fall 2023 | September – November 2023 (Weeks 4 – 12) | NeuroWellness |
| Fall 2023 | November 2023 (Week 14) | PSE Posttest 2 |
| Spring 2024 | January 2023 (Week 3) | PSE Pretest 3 |
| Spring 2024 | January – March 2024 (Weeks 4-12) | NeuroWellness |
| Spring 2024 | April 2024 (Week 14) | PSE Posttest 3 |
| Spring 2024 | April 2024 (Week 15) | Student Narrative Reflections & Client Experiences Survey |

To match participant scores for analysis, the researcher collected demographic information on the questionnaires, including initials, age, and gender. The identifying (demographic) information was transferred and stored in a password-protected Excel document. Next, the researcher generated a random number code via an online random number generator (www.gigacalculator.com) (Georgiev, n.d.). This code was matched to demographic information and stored in the password-protected document. The quantitative questionnaire data was transferred to an additional password-protected Excel document with the generated random code.

Qualitative data was de-identified by matching student demographic responses to the previously generated codes. The written reflection responses were associated with the corresponding random code, transferred to, and stored in a password-protected Excel document.

**Institutional Review Board**

An exemption was obtained from a full review from the Institutional Review Board (IRB) at MBU in June 2023 to collect data during the academic course series (Appendix E). In January 2024, the Radford University IRB acknowledged the MBU IRB approval in writing for this study to proceed (Appendix E). All data related to this project was stored in password-protected files and on a password-protected laptop. A random code was generated to match pre- and posttest scores, success experiences, and qualitative data. This limited the risk of a data breach so that data would not be tied back to participating students. Only the researcher and the capstone committee had access to raw data.

**Data Analysis**

To ensure accuracy, the data transferred to the Excel spreadsheet was manually checked during data analysis by an additional faculty member not involved in the project. The data was then imported into SPSS for data analysis. Statistical significance was set at $p<.05$ for all analyses. The data was coded as indicated in Appendix F, the codebook. The PSE item scores were summed to calculate a total self-efficacy score as well as totals for each of the subscales. The first semester with no experiential learning activity was coded as “1” and the two semesters with the activity were coded as “2” and “3” for semesters with experiential learning participation. To analyze whether students interacted with success experiences, they reported client improvement on measured outcomes. This was coded as “0” for no successes, and “1” through “4” for the number of clients with which students reported experiencing a measured success experience.

A 2x3 repeated measures ANOVA was used to examine RQ1. This determined whether time and semester were associated with changes in total PSE scores and sub-scores (Appendix G). This test answered the question: Is experiential learning associated with a change in self-efficacy? First, the ANOVA tested whether changes in self-efficacy showed a significant effect over time within each semester. Then it examined if the mean changes in self-efficacy differed significantly from one semester to the next, indicating an effect for the semester. Finally, the ANOVA determined whether changes in self-efficacy during each semester differed from one another, indicating an interaction between time and semester. This interaction effect indicated that the content of each semester was significant—specifically, the presence of the experiential learning activity, which was absent in semester one but present in semesters two and three. The dependent variable for each of the five hypotheses was changes in PSE scores for the total score or domain.

A one-way ANOVA was used to examine RQ2 (Appendix G). This determined if engaging with success experiences was associated with self-efficacy scores. The ANOVA determined if those who engaged with success experiences had significantly greater self-efficacy scores than those who did not. Additionally, it determined if those who experienced more success had even greater self-efficacy. The dependent variable was total self-efficacy at the end of semester three. The table presenting the data analysis which connects statistical tests to hypotheses is located in Appendix F.

Using the Taguette (Remi, n.d.) qualitative resource tool, thematic analysis was conducted to identify themes in the qualitative data. All narrative reflection responses (N=215) were deidentified and then downloaded to Taguette as one document. After initially reading the responses as one document, deductive coding was used to analyze the responses (Creswell, 2005; Fereday & Muir-Cochrane, 2006). Aligning with the literature on self-efficacy, this study examined the reflections for the following codes: success experiences, feedback, and peer or mentor modeling (Bandura, 1977). To investigate the relationship between experiential learning constructs and self-efficacy, the following codes were explored: concrete or practical experiences, reflection, and active experimentation. Statements that aligned with each code were highlighted and tagged to the corresponding code.

Using inductive coding, this study also searched for other common elements among the participant responses (Creswell, 2005; Ingram et al., 2019). The reflection responses were read again, and common statements were highlighted. These highlighted statements were analyzed and grouped into codes, such as *confidence mindset* and *participant motivation* (see Appendix H). All codes were then combined into one chart, analyzed for corroboration, and then interpreted into major themes (Fereday & Muir-Cochrane, 2006). Lastly, these themes were triangulated with and used to help explain the results of the quantitative analysis.

# Chapter Four: Results

This study used a sequential-explanatory mixed methods approach to analyze the relationship between DPT student participation in an experiential learning activity with individuals with neurologic disorders and self-efficacy with this population. First, an overview of the participant demographics will be provided. Next, the quantitative analysis of the participants' responses to the Physiotherapy Self-Efficacy (PSE) questionnaire will be presented for each research question followed by corroborating themes identified through qualitative analysis of the students' reflections on their experiential learning activity, NeuroWellness. Appendix H provides the codes, themes, and samples of students' reflections that correspond to each code and theme.

## Demographics

Twenty-eight second-year DPT students from Mary Baldwin University (MBU) in Fishersville, VA participated in this study. The mean age of participants was 23.8 years (SD=1.36). Twenty-three (82%) participants were female, and five (18%) participants were male. At baseline (pretest 1), the mean total self-efficacy scores on the Physiotherapist Self-Efficacy (PSE) questionnaire for participants was 24.25 (SD=9.12) out of a possible 65.

## Research Question 1

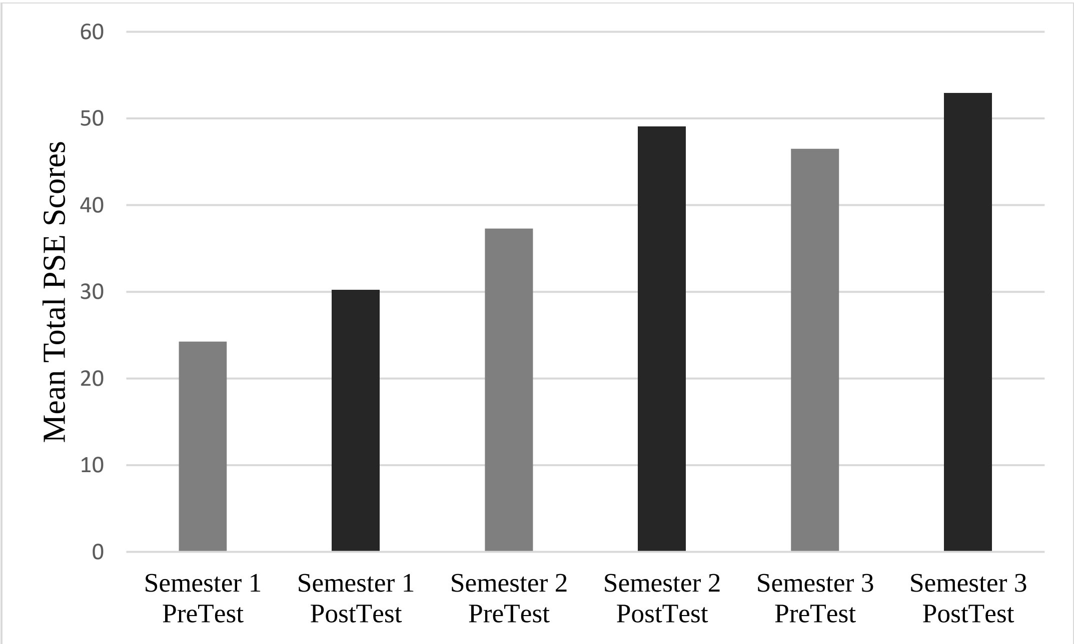
## Is PT student participation in a neurologic experiential learning activity associated with students' self-efficacy when working with neurologic populations?

### *Overall Self-Efficacy Scores*

Overall self-efficacy with neurologic populations was calculated using the sum of scores on all 13 items on the PSE questionnaire. A 2x3 repeated measures ANOVA with a Greenhouse-Geisser correction was used to determine whether there were significant changes in total PSE scores over time. All participants completed the PSE at six points in time, including one pretest and one posttest over three consecutive semesters (Figure 3). It was determined that the mean total PSE scores demonstrated a statistically significant difference between pretest and posttest ($F$(1,27) = 131.14, p<.001).

**Figure 3**

*Total PSE Scores*




*Note.* This figure displays the mean total PSE scores for participants over time, pre- and posttests, for semesters one through three.

The 2x3 repeated measures ANOVA with a Greenhouse-Geisser correction was also used to determine whether there were significant changes in total PSE scores between semesters. The participants completed the PSE questionnaire at the beginning and end of each of three consecutive semesters. During the first semester, students did not participate in an experiential learning activity but were enrolled in an academic course that contained neurologic rehabilitation content. During the second and third semesters, students participated in the experiential learning activity and were enrolled in an academic course that contained neurologic rehabilitation content.

It was determined that total PSE scores demonstrated a statistically significant difference over each semester ($F(1, 38) = 71.60$, $p<.001$). Post hoc analysis with a Bonferroni adjustment showed that mean changes in total PSE scores were statistically significant from semester one to semester two (M=15.95 (95% CI, 21.73 to 10.17), $p<.001$) and from semester two to semester three (M=6.54 (95% CI, 9.43 to 3.65), $p<.001$).

Lastly, the 2x3 repeated measures ANOVA with a Greenhouse-Geisser correction was used to determine whether there was a significant interaction between time and semester in total PSE scores. This test found that total PSE scores demonstrated a statistically significant interaction for time and semester ($F(1, 40)$, $p=.003$). Therefore, the null hypothesis H1.1o, "PT students who participate in a neurologic experiential learning activity will not have significantly improved overall self-efficacy with neurologic populations," is rejected. This indicated that the change in overall self-efficacy over time varied depending on the semester, with significant differences observed in the semesters that included experiential learning.

Participant reflections agreed with an increase in overall self-efficacy in working with individuals with neurologic disorders. A prominent qualitative theme of *confidence*, related to the self-efficacy construct of affective states, emerged from the reflection statements. Out of 215 reflection statements, 37 (17.2%) pertained to feelings of confidence or maintaining a positive emotional mindset regarding one's skills or abilities (Appendix H). The reflections described varying levels of change. One student documented minor changes, "After, I feel slightly more confident, but I very much understand I have a lot of studying to do and experience to gain before I am fully confident." Other statements reflected more pronounced changes in confidence:

> I was worried that I was not going to be able to work with the patients to be able to figure out exercises to be able to help them. After the first week, I realized that I have the skills

> to work with these patients and I just need to trust in myself and my ability. If you would have asked me a year ago if I would be able to help a patient walk who is wheelchair bound, I would have laughed in your face. Now I don't even have to think twice about how to do it because of NW and classes.

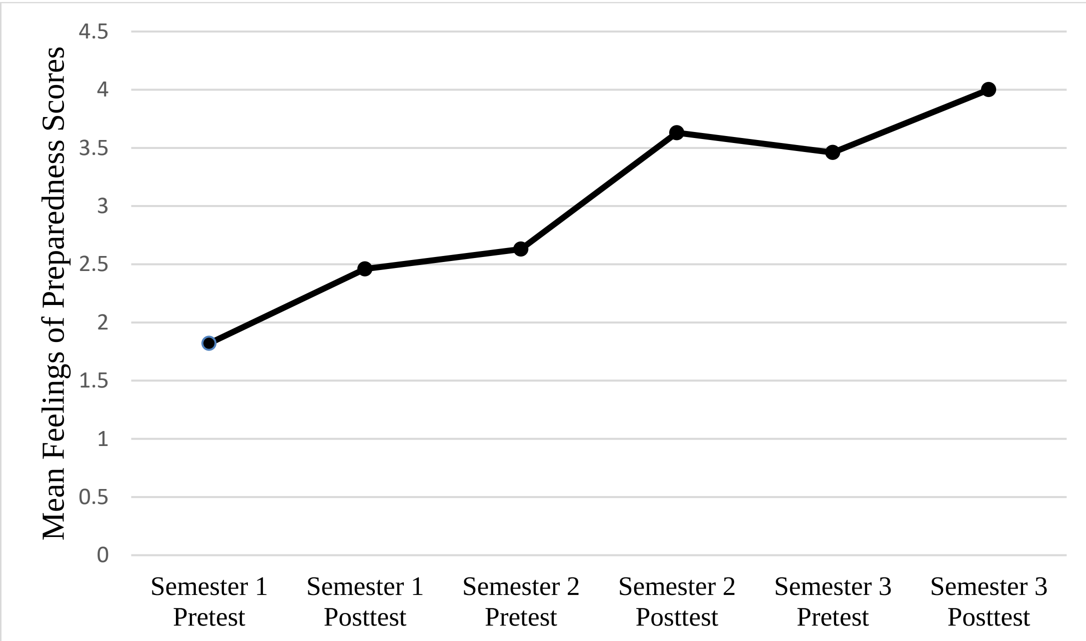
Another participant summarized this sentiment, "So overall, my confidence increased with repeated exposure to the clinic and using my hands-on skills."

### ***Feelings of Preparedness Scores***

Feelings of preparedness were measured using the average of the scores of two items on the PSE, including, "I feel adequately prepared to undertake a neurology caseload," and, "I feel that I am able to deal with the range of patient conditions which may be seen with a neurology caseload" (Van Lankveld et al., 2017). A 2x3 repeated measures ANOVA with a Greenhouse-Geisser correction showed that the mean feelings of preparedness scores demonstrated a statistically significant difference between pre- and posttests ($F(1,27) = 140.12$, $p<.001$) (Figure 4). This test also showed a statistically significant difference in mean scores for feelings of preparedness between semesters ($F(2, 41) = 57.83$, $p<.001$). Mean changes in scores for feelings of preparedness were tested via post hoc analysis with a Bonferroni adjustment. This showed a statistically significant increase from semester one to semester two (M=0.98, (95% CI, 1.35 to 0.62), $p<.001$) and from semester two to semester three (M=0.61, (95% CI, 0.81 to 0.40), $p<.001$).

**Figure 4**

*Feelings of Preparedness Scores*




*Note.* This figure displays the mean feelings of preparedness scores for participants over time, pre- and posttests, for semesters one through three.

The 2x3 repeated measures ANOVA with a Greenhouse-Geisser correction was used to determine whether there was a significant interaction between time and semester in feelings of preparedness scores. This test demonstrated that feelings of preparedness scores showed a statistically significant interaction for time and semester ($F(2, 49)$, p=.021). The null hypothesis H1.2o, "PT students who participate in a neurologic experiential learning activity will not have significantly improved feelings of preparedness for working with neurologic populations," is rejected. Therefore, this indicated that the change in feelings of preparedness over time varied depending on the semester, with significant differences observed in the semesters that included experiential learning.

Although this was not a major qualitative theme identified in the participants' reflections, three participants mentioned feeling more prepared after NeuroWellness: "I feel more ready…," "I feel better prepared," and, "[I]…feel more prepared going into…my rotation." In contrast, four statements reflected a desire for more time working with this population to feel more comfortable. One participant stated, "I would still say I would like more experience to feel even more comfortable working with this population."

### *Confidence in Communication Scores*

Confidence in communication was measured using the average of two items on the PSE, including, "I feel that I am able to verbally communicate effectively and appropriately for a neurology caseload," and, "I feel that I am able to communicate in writing effectively and appropriately for a neurology caseload" (Van Lankveld et al., 2017). A 2x3 repeated measures ANOVA with a Greenhouse-Geisser correction demonstrated a statistically significant difference in mean confidence in communication scores from pretest to posttest ($F(1,27) = 84.18$, $p<.001$). The repeated measures ANOVA also showed a statistically significant difference in mean confidence in communication scores between semesters ($F(1, 35) = 53.98$, $p<.001$). Post hoc analysis with a Bonferroni adjustment showed that mean changes in confidence in communication scores were statistically significant from semester one to semester two (M=1.00 (95% CI, 1.36 to 0.64), $p<.001$) and from semester two to semester three (M=0.54 (95% CI, 0.70 to 0.38), $p<.001$).

The 2x3 repeated measures ANOVA with a Greenhouse-Geisser correction determined that confidence in communication scores did not show a statistically significant interaction for time and semester ($F(2, 50)$, $p=.304$). The change in confidence in communication scores did not exhibit significant differences in the semesters that included experiential learning. Therefore, the null hypothesis H1.3o, “PT students who participate in a neurologic experiential learning activity will not have significantly increased confidence in their communication skills for working with neurologic populations,” is rejected for the main effects of time and semester but fails to be rejected for the interaction effect. This indicates that while time and semester significantly affected confidence in communication scores on their own, their combined effect did not significantly differ from what would be expected if they were acting independently.

Two qualitative themes emerged that were related to communication. The first theme, *vicarious experiences*—a self-efficacy theory construct—was referenced 23 times by participants in the context of peer modeling and feedback experiences. The second theme, *verbal persuasion*—also a theory of self-efficacy construct—was mentioned 11 times in relation to mentor modeling and feedback. In total, 20 out of 215 statements highlighted communication or collaboration involving communication. Several participants remarked on positively communicating ideas between peers in statements like, “I really enjoyed bouncing ideas back and forth to reach a solution,” and, “I think having someone else[‘s] confirmation of your idea really builds your confidence up.” Other participants remarked on the role of criticism from their peers, “I also found a new appreciation for constructive peer criticism. In both semesters I was paired with strong individuals who had excellent ideas and are frequently outspoken.” Only one student mentioned communication with a client in the reflections.

### ***Confidence in Performing Examination Skills Scores***

Confidence in performing examination skills scores was measured using the average of two items on the PSE, including, “I feel that I am able to perform subjective assessments for a neurology caseload,” and, “I feel that I am able to perform objective assessments for a neurology caseload” (Van Lankveld et al., 2017). A 2x3 repeated measures ANOVA with a Greenhouse-

Geisser correction showed a statistically significant difference in mean confidence in performing examination skills scores over time from pre- to posttests ($F(1,27) = 50.45$, $p<.001$). This test also demonstrated a statistically significant difference in mean confidence in performing examination skills scores between semesters ($F(1, 38) = 70.75$, $p<.001$). Mean changes in scores for confidence in performing examination scores were tested via post hoc analysis with a Bonferroni adjustment. This showed a statistically significant increase from semester one to semester two (M=1.39, (95% CI, 1.78 to 1.00), $p<.001$) and from semester two to semester three (M=0.55, (95% CI, 0.75 to 0.34), $p<.001$).

The 2x3 repeated measures ANOVA with a Greenhouse-Geisser correction was used to assess the interaction effect between time and semester on confidence in performing examination skills scores. The analysis showed that there was not a statistically significant interaction between time and semester ($F(2, 41)$, $p=.855$). The change in confidence in examination skills scores did not exhibit significant differences in the semesters that included experiential learning. Therefore, the null hypothesis H1.4o, "PT students who participate in a neurologic experiential learning activity will not have significantly increased confidence in performing examination skills for working with neurologic populations," is rejected for the main effects of time and semester but fails to be rejected for the interaction effect. This indicates that while time and semester each significantly affected confidence in performing examination scores on their own, their combined effect did not significantly differ from the effects of each independently. Although the qualitative theme of *concrete experiences* comprised the largest proportion of the participants' reflections, no statements specifically mentioned examination skills or experiences.

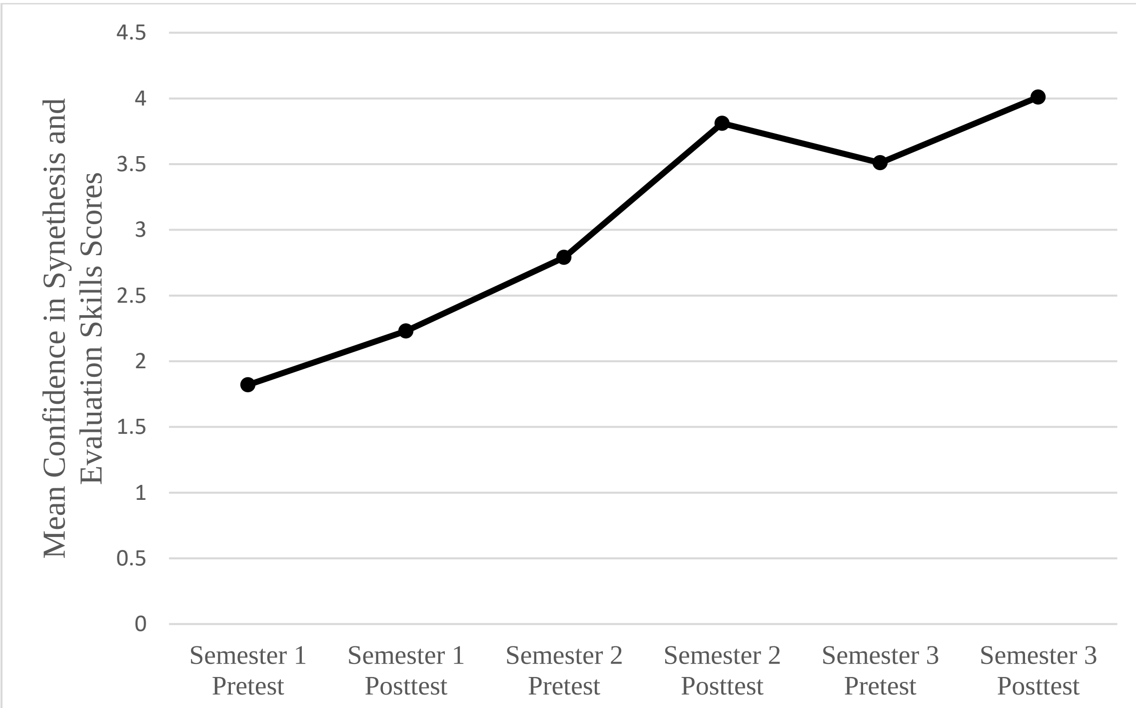
***Confidence in Synthesis and Evaluation Skills Scores***

Confidence in synthesis and evaluation skills was assessed by averaging the scores on five items on the PSE, including, “I feel that I am able to interpret assessment findings appropriate for a neurology caseload,” “I feel that I am able to identify and prioritize patient’s problems for a neurology caseload,” “I feel that I am able to select appropriate short and long term goals for a neurology caseload,” “I feel that I am able to perform discharge planning for a neurology caseload,” and, “I feel that I am able to evaluate my treatments for a neurology caseload” (Van Lankveld et al., 2017). A 2x3 repeated measures ANOVA with a Greenhouse-Geisser correction revealed a statistically significant difference in mean confidence in synthesis and evaluation skills scores between pre- and posttests ($F(1, 27) = 96.24$, $p<.001$) (Figure 5). This test also showed a statistically significant difference in mean confidence in synthesis and evaluation skills scores between the semesters ($F(1, 40) = 60.93$, $p<.001$). Post hoc analysis with a Bonferroni adjustment demonstrated that mean changes in confidence in synthesis and evaluation skills scores were statistically significant from semester one to semester two (M=1.28, (95% CI, 1.66 to 0.88), $p<.001$) and from semester two to semester three (M=0.46, (95% CI, 0.67 to 0.25), $p<.001$).

A 2x3 repeated measures ANOVA was used to determine whether there was a significant interaction between time and semester in confidence in synthesis and evaluation skills scores. The analysis showed a statistically significant interaction between time and semester ($F(1, 10) = 13.08$, $p<.001$). Therefore, the null hypothesis H1.5o, “PT students who participate in a neurologic experiential learning activity will not have significantly increased confidence in their synthesis and evaluation skills for working with neurologic populations,” is rejected. Therefore, this indicated that the change in confidence in synthesis and evaluation skills varied over time depending on the semester, with significant differences observed in the semesters that included experiential learning.

**Figure 5**

*Confidence in Synthesis and Evaluation Skills Scores*




*Note.* This figure displays the mean confidence in synthesis and evaluation skills scores for participants over time, pre- and posttests, for semesters one through three.

Performing evaluations and synthesizing client information was reflected in the *concrete experiences* qualitative theme in the participants' reflections, albeit to a minor degree. One participant specifically highlighted the impact of NeuroWellness on this skill, "I will go into clinicals and work after graduation with skills I otherwise wouldn't have had…I will have had experience conducting evaluations, creating POCs [plans of care]…for stroke patients that I will use in the clinic."

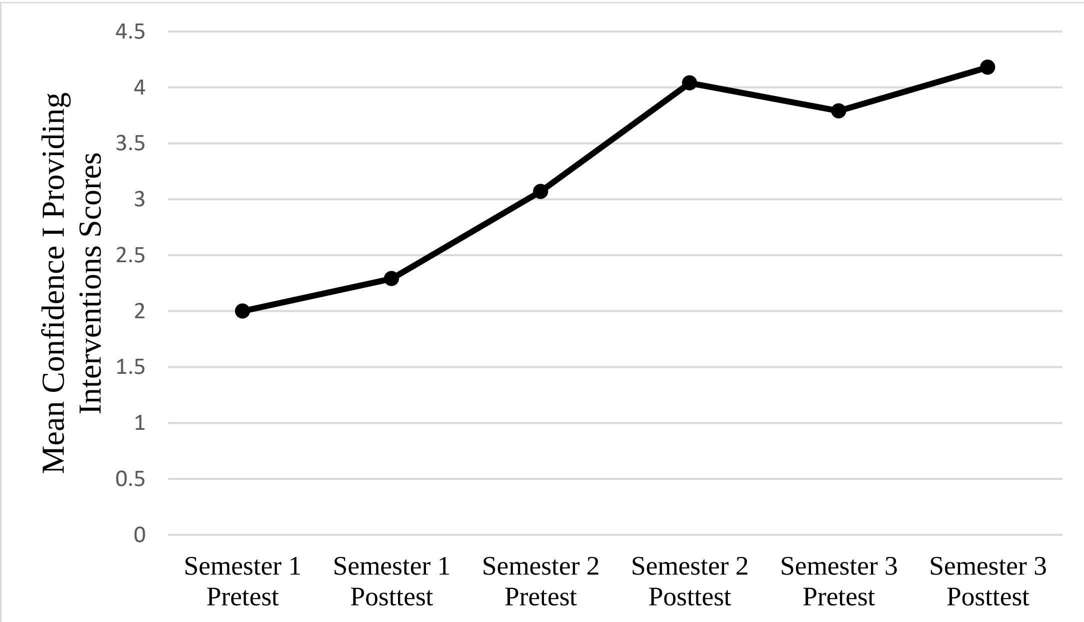
***Confidence in Skillfully Providing Interventions***

Confidence in skillfully providing interventions was calculated using the average of scores from two items on the PSE, including, "I feel that I am able to appropriately perform treatments for a neurology caseload," and, "I feel that I am able to progress interventions appropriately for a neurology caseload" (Van Lankveld et al., 2017). A 2x3 repeated measures ANOVA with a Greenhouse-Geisser correction determined that there was a statistically significant difference in mean scores of confidence in skillfully providing interventions over the six time points ($F(1,27) = 65.97$, $p<.001$) (Figure 6). The repeated measures ANOVA also showed a statistically significant difference in mean scores of confidence in skillfully providing interventions between each semester ($F(1, 42) = 66.12$, $p<.001$). Mean changes in scores for confidence in skillfully providing interventions were tested via post hoc analysis with a Bonferroni adjustment. This analysis revealed a statistically significant increase from semester one to semester two (M=1.41, (95% CI, 1.82 to 1.00), $p<.001$) and from semester two to semester three (M=0.43, (95% CI, 0.63 to 0.23), $p<.001$).

The 2x3 repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean confidence in skillfully providing interventions scores showed a statistically significant interaction for time and semester ($F(2, 44)$, $p<.001$). The null hypothesis H1.6o, "PT students who participate in a neurologic experiential learning activity will not have significantly increased confidence in skillfully providing interventions for neurologic populations," is rejected. Therefore, this indicated that the change in confidence in providing interventions varied over time depending on the semester, with significant differences observed in the semesters that included experiential learning.

**Figure 6**

*Confidence in Skillfully Providing Interventions Scores*




*Note.* This figure displays the mean confidence in skillfully providing interventions scores for participants over time, pre- and posttests, for semesters one through three.

The most prominent qualitative theme identified in the reflections was *concrete experiences*—an ability within experiential learning theory. Related to this theme, one in five statements (20.5%) included participant reflections on practical or specific experiences or skills. Notably, 75% of these statements described the process of prescribing or carrying out interventions. Some reflection statements highlighted the cognitive aspect of creating interventions or plans, such as, “One skill that improved during NeuroWellness would be coming up with interventions that will challenge the individual,” and, “One skill that I was able to learn and improve through NeuroWellness was creating individualized treatment plans that were tailored to each patient and their personal needs.” Other reflections detailed the physical act of assisting patients with interventions, for example, “My transfer skills came to life during NeuroWellness,” and:

> One skill I improved on through NeuroWellness was my ability to practice gait training with a patient. [The client] was very hands-on during gait training, so I was able to improve on how I instructed her during the moment. Also, I never really transferred patients outside of lab, so I was able to work on and improve my transfer techniques with a patient who required more assistance.

**Research Question 2**

**Is the amount of PT student engagement with success experiences associated with a PT student’s total self-efficacy score when working with neurologic populations?**

PT student engagement with success experiences was determined by asking participants to indicate the number of their NeuroWellness clients who showed measurable improvement on outcome measures they conducted (Table 2). The total self-efficacy score was assessed using the final posttest score on the PSE (posttest three).

**Table 2**

*Success Experiences Data*

| Number of Success Experiences | N | Mean Total PSE Posttest 3 Score | Standard Deviation |
|---|---|---|---|
| 1 | 2 | 59.50 | 2.12 |
| 2 | 13 | 49.85 | 7.63 |
| 3 | 10 | 54.00 | 4.45 |
| 4 | 3 | 58.33 | 6.03 |
| Total | 28 | 52.93 | 6.84 |

*Note.* This table displays the number of success experiences indicated by participants, the corresponding number of participants, their mean total final PSE scores, and the standard deviations.

A one-way ANOVA was conducted to determine whether the number of success experiences reported by participants was associated with mean total self-efficacy scores. There were no statistically significant differences in mean total PSE scores between the different numbers of success experiences ($F(3,24) = 2.59$, $p=.076$). The null hypothesis, H2.1o, "PT students who engage with more success experiences during a neurologic experiential learning activity will not have significantly greater total self-efficacy scores," fails to be rejected.

Though there was not a significant association between the number of success experiences and the total self-efficacy score, there was a trend in the relationship between self-efficacy and success experiences. Those who reported only one success experience (N=2) had the highest mean self-efficacy (M=59.50, SD=2.12). Participants who reported two (N=13, M=49.85, SD=7.63), three (N=10, M=54.00, SD=4.45), or four (N=3, M=58.33, SD=6.03) success experiences had increasing amounts of self-efficacy with success experiences reported.

While no significant association was found between the number of success experiences and the total self-efficacy score, participants consistently emphasized personal and client improvement in their reflections. Thirty out of 215 (15%) statements noted personal or client accomplishments. Of these 30 statements, over half (N=18) specifically referenced client successes, including, "It was great to see how encouraged [the clients] were by seeing their improvements themselves," "Getting to see her hard work and determination pay off and her significant mood change over the 4 weeks working with her makes it all worth it and confirms why PT is the profession I want to be in," and, "I was sweating during that session, and she left happy, so I felt very fulfilled." Thirteen statements reflected personal successes, including tentative success statements, such as, "It has shown me that even though I was uncomfortable, I was still capable of a lot more than I thought." Participants also remarked on more overt feelings of accomplishment:

> My most meaningful experience in NeuroWellness was seeing me and my classmates' progress from last semester's NeuroWellness to this semester's. Last semester, the majority of us did not feel confident in our abilities to help clients with neurological conditions and impairment, and I think we spent more time worrying than collaborating together. This semester was completely different. I really felt like we were helping our clients to our best ability – which could be seen through our constant collaboration and better thought-out interventions.

# Chapter Five: Discussion

The purpose of this study was to examine whether physical therapy (PT) student participation in an experiential learning activity with neurologic populations was associated with PT student self-efficacy with neurologic populations. DPT students at Mary Baldwin University reported their self-efficacy with neurologic populations via pre- and posttests across three semesters. In the first semester, participants did not complete the experiential learning opportunity (NeuroWellness), and in the second two semesters, they did participate in NeuroWellness.

After the analyses, the study revealed several significant findings. First, the quantitative analysis supported the current literature, showing that students experienced overall increases in total self-efficacy with neurologic populations after participating in NeuroWellness. A second major finding also supported the literature on self-efficacy by demonstrating that there were significant improvements in self-efficacy in specific tasks or skills that were practiced in NeuroWellness. A third finding added to the current literature on self-efficacy: Even though there was no quantitative relationship between self-efficacy and student-reported successes, participants commonly cited successes as positively influencing their feelings towards their abilities during and after NeuroWellness. In addition to the findings of this study, this chapter discusses the implications that PT education programs should incorporate experiential learning with neurologic populations into their curricula.

## Students Experienced Overall Increases in Self-Efficacy

Participants in this study experienced significant increases in total self-efficacy with a neurologic caseload over both time and semester, and as a result of an interaction of time and semester. This confirms Venskus' and Craig's (2017) finding that physical therapy students' self-efficacy in a specific setting, acute care, increased over time and because of their experiences. PT student self-efficacy with a specific population was positively impacted by environmental inputs, including educational experience.

The present project provided participants with complex interactions with clients with real-world needs. NeuroWellness offered students interactions that could not be introduced in didactic or laboratory coursework. Consequently, the participants' overall improvements in self-efficacy may have been due to several features and outcomes of the interactions during their experience in NeuroWellness. Delivered through methods also identified in the literature, the interactions involved a moderate "dose" (16 hours) and had participants working either alone or in pairs, fostered a sense of preparedness in the participants, provided concrete learning experiences, and resulted in increased self-efficacy that may be predictive of their future clinical success.

***Experiential Learning Modes of Delivery***

This project used two purposeful modes of delivery, which included the dose of time students spent actively participating in the learning experience and the ratio of the students to clients. The dose of learning in the current project was effective and agreed with the literature that shows that varied doses of learning experiences may be effective in positively impacting self-efficacy. Research has examined overall self-efficacy with PT students using varied doses of experiential learning, some similar to this current project and others that differ (Lowe et al., 2022; Wolden et al., 2019). Wolden et al. (2019) studied self-efficacy in PT students who participated in a pediatrics experiential learning activity for a total of 16 hours, the same dose of experiential education as the current study. Like the findings of the present study, Wolden et al. demonstrated significant improvements in PT student self-efficacy ($p=.000$, $p=.001$). Lowe et al.

(2022) compared low (3 hours) and high (15 hours) doses of experiential learning in a PT education program. They found that both low-dose and high-dose groups experienced significant improvements in self-efficacy ($p=.000$) but that there was no significant interaction between time and dose ($p=.29$), as found in the current study. These authors asserted that experiential learning provided students with a focused opportunity for specific learning embedded in a PT curriculum, at varied doses, that produced significant improvements in their confidence.

In this current project, students worked either alone or in pairs, providing a more realistic experience that mirrors physical therapy clinical settings. Much of the literature on PT education and experiential learning shows positive outcomes from learning in small groups in experiential learning (Barta et al., 2018; Dockter et al., 2020; Gustaffson et al., 2016; Qutishat et al., 2021). In Barta et al.'s (2018) study, PT students worked in groups of three to five. They found that students reported significantly more confidence in working with neurologic populations after four sessions over four weeks of an experiential learning activity ($p<.001$). Other studies show significant positive self-efficacy outcomes from students working one-one-one with clients, agreeing with this present study (Shields & Taylor, 2014; Wolden et al., 2019). Though the approach of providing students with a more realistic clinical experience via a one-on-one scenario may seem superior to small groups, the research supports small and "smaller" group learning.

***Experiential Learning Promotes Preparedness***

In addition to the mode of delivery, NeuroWellness also contributed to participants' outcomes by significantly increasing their feelings of preparedness to practice with neurologic populations, highlighting the program's effectiveness in improving students' readiness for clinical practice. Consistent with this outcome, Silberman et al. (2016) found a qualitative theme after studying PT students who participated in experiential learning: Students felt more prepared to practice in a specific area of physical therapy practice. In their randomized control trial, the researchers recognized that participants experienced significantly greater changes in self-efficacy following high-fidelity simulation than the group who did not participate in the simulation.

### *Concrete Experiences are Impactful*

In this current project's participant narrative reflections, students most frequently referenced situations with *concrete experiences* they encountered in the experiential learning activity as impacting their skills and abilities. In alignment with experiential learning theory's ability of concrete experiences, these experiences helped students grasp learning by sensing and processing practical situations and concepts (Kolb, 1984). One participant highlighted this learning experience, following up with what they explicitly gained, "Nothing we do in the classroom or lab periods is up to par with the learning experience that our sessions at the YMCA provide…My transfer skills came to life during NeuroWellness." NeuroWellness provided the opportunity to engage with concrete experiences not otherwise available to students in the classroom or laboratory.

### *Self-Efficacy is One Predictor of Effectiveness in Clinical Practice*

Through significantly improved self-efficacy scores and corroborating participant narrative reflection statements, this current study demonstrated significant increases in self-efficacy after experiential learning, adding to the literature on predicting preparedness for PT clinical practice. To prepare students for clinical practice, experiential education is one of the most effective ways to increase self-efficacy in clinical practice, and measuring self-efficacy may be one way to predict student readiness to practice clinically. Research demonstrates this connection between predicting clinical practice and self-efficacy (Jones & Sheppard, 2011;

Reynolds et al., 2021; Rosenfeldt et al., 2020). Jones and Sheppard (2011) found a moderate correlation between self-efficacy and clinical performance ($p=.05$). However, they discovered that groups that had additional training overestimated their clinical performance compared to the control group whose self-efficacy ratings aligned with their clinical performance. Therefore, the authors suggested this may be *one* method to assess students' readiness for clinical practice. They did recommend following up after educational interventions to further assess readiness, which was accomplished in this current study through student reflections.

While it is unknown if participants' self-efficacy scores in this present project are predictive of their future clinical success, the research suggests that this may be *one* way PT educators may use this information. Rosenfeldt et al. (2020) purported that self-efficacy in PT students may be *one* predictor but not the sole predictor of clinical performance. The authors found low to moderate yet statistically significant correlations between PT student confidence scores and PT student clinical performance ($p<.05$). In their mixed methods study of PT students' experience with objective structured clinical examinations (OSCE), Ferreira et al. (2020) observed a strong relationship between self-efficacy scores and performance on the OSCE ($p=.007$). Students who reported higher levels of self-efficacy felt that their confidence induced calmer feelings while taking the examination, which led to superior examination performance. In their systematic review of non-cognitive factors related to performance in graduate rehabilitation science students, Reynolds et al. (2021) found that self-efficacy had the most utility in predicting clinical performance out of the non-cognitive factors they studied.

**Improvements in Self-Efficacy in Specific Tasks**

This study's quantitative analyses revealed significant improvements in several specific areas of neurologic PT practice. These findings strongly align with Bandura's (1997) principle of self-efficacy theory, which states that self-efficacy beliefs are task- and situation-specific. Feelings of preparedness scores, confidence in synthesis and evaluation, and confidence in skillfully providing interventions improved significantly over time, over the semesters, and demonstrated an interaction for time and semester. Additionally, several narrative reflections in this project exemplified students feeling more prepared or ready for clinical experiences and almost one-quarter of student reflections mentioned providing interventions as impactful. Therefore, improvements in these particular skills were associated with participating in NeuroWellness. Students further refined these specific skills through assignments that prompted students to apply synthesis and evaluation and provide interventions to the NeuroWellness clients at each session.

Consistent with the results from this current study, Van Lankveld et al. (2017) found that PT students' self-efficacy beliefs were specific to both clinical practice areas and clinical skills or tasks. They conducted a large study of 207 students and determined there was a correlation between self-efficacy beliefs and specific clinical settings, like musculoskeletal and neurologic ($p<.01$). Moreover, a relationship was also found at an even more specific level, such as confidence in communication with musculoskeletal caseloads. Jones et al. (2021) found that students cited most frequently that opportunities to practice interprofessional communication were the main reason that their confidence in interprofessional communication improved. They also found an inverse relationship: The students reported that they were shielded from situations involving conflict and reported lower confidence in knowing how to resolve conflict as a professional. Likewise, Forbes et al. (2018) identified that low self-efficacy in new physical therapists may prevent them from performing specific skills, like providing pain education.

Several statements in the narrative reflections in this current project aligned with these concepts, citing specific hands-on skills or experiences as influencing their confidence in their abilities. Ivey et al. (2018) found that PT and occupational therapy (OT) students who participated in case-based experiential learning demonstrated increased self-efficacy in evaluation and feedback. Students remarked that hands-on time was the most valuable contributor to this change. The qualitative data Silberman et al. (2016) collected revealed the specific skills in which students grew more confident, which were all specifically practiced in high-fidelity simulations. Paul et al. (2022) also found that students' confidence improved in all areas that students practiced but their largest significant improvement in confidence was in the skill most frequently performed in their experiential learning activity, performing interviews ($p=.001$).

In the present study, participants' scores in confidence in communication and performing examinations improved over time and semester but did not demonstrate an interaction for time and semester. Though these improvements likely resulted from exposure to additional practice of these skills during NeuroWellness, the conclusion cannot be made that they resulted from the experiential learning activity. The participants did not perform complete examinations and were not assigned specific assignments related to communication; thus, improvements may have been limited as participants practiced other skills in a more focused way. Improvements may also have occurred due to participants' maturation in their complete physical therapy education experiences over the three semesters.

**Influence of Success Experiences**

In this current project, mastery experiences were defined by the researcher as students' reports of positive objective changes in their clients' performance on outcome measures in

NeuroWellness; and were called success experiences. The literature on self-efficacy identifies mastery experiences as the most significant influence on developing self-efficacy (Bandura, 1997). However, there is a gap in the current literature that explores the relationship between PT student self-efficacy and mastery experiences. The body of literature does not consistently define what constitutes mastery or success in a student experience, thus there is limited reliability in the literature regarding the effect of mastery experiences in PT experiential learning.

No significant quantitative relationship was found between the number of success experiences students identified and overall self-efficacy. Of interest, the students (N=2) who identified the least success experiences (N=1) reported the highest mean total self-efficacy (M=59.50, SD=2.12). The next highest mean total self-efficacy (M=58.33, SD=6.03) was reported by the students (N=3) who identified success experiences (N=4) with all their clients.

Though there is minimal research regarding PT students' mastery experiences and self-efficacy, this present study aligns with evidence in the health science and general education fields. Agreeing with the lack of a significant quantitative relationship between success and self-efficacy scores in the present project, Kim et al. (2022) found no relationship between self-efficacy and mastery of a tested nursing skill in nursing students (p=.103). An important difference between Kim et al.'s study and this current one is the definition of the mastery or success experience. Kim et al. defined mastery as skill performance assessed by nursing faculty, while the current study asked students to report the number of times they successfully helped clients improve on functional outcome measures.

Though Kim et al.'s (2022) research agreed with the findings of this current study, other research on the relationship between success or mastery and self-efficacy differs. In Ferreira et al.'s (2020) work that studied the relationship between self-efficacy and performance on OSCE's in PT students, self-efficacy was moderately and directly related to exam performance (p=.0007). They did find, however, that some students' self-efficacy scores over- or underestimated their actual exam performance, agreeing with the current study in that the students who reported the least success had the highest self-efficacy scores and those with the most common number of successes (N=2) reported the lowest self-efficacy scores (M=49.85, SD=7.63).

In contrast to the lack of quantitative data to support a positive relationship between success and self-efficacy in the current project, 15% of the narrative reflection statements highlighted students' experiences with success. In these reflections, participants noted experiences where clients showed improvement or where they experienced personal growth. In small group interviews, Ferreira et al. (2020) found that students cited that previous successful experiences with OSCE exams and gaining skills led to their improved confidence. Kaldheim et al. (2021) also gleaned evidence about the relationship between students' success and self-efficacy through qualitative research. They identified in focus group interviews that nursing students experienced a sense of mastery during simulation-based learning when they were able to manage tasks during the scenarios.

Therefore, the outcomes of the current study align with most of the literature based on the qualitative results discovered. This may be because the question posed to the participants may not have represented how those participants viewed mastery or success. They may have viewed success as small, affective-oriented victories in their own clinical or professional abilities or immeasurable gains in their clients, rather than measurable, objective ones. Consistent with this idea, Ingram et al. (2019) found that new PT clinicians who were asked about their confidence in assessing and managing pain defined mastery experiences as those that allowed them to gain a "better clinical grasp on the situation." Gale et al. (2021) found that new teachers defined mastery experiences in varied and less objective ways: "seeing the lightbulb come on in my students," "…the success my students had on the end of the year…exams," and "all students [were] very engaged." Therefore, an analysis of the research in this area reveals some commonalities: It contains varied definitions of success or mastery experiences, there may be multiple ways to quantify mastery, and there is likely a positive relationship between mastery and self-efficacy.

## Implications for Future Practice and Research

Physical therapy (PT) education programs must respond to the increased demand for neurologic PT that results from the increased prevalence and burden of adults living with neurologic disorders in the United States (Dumurgier & Tzourio, 2020; Feigin et al., 2021). The needs of this population are complex to manage clinically, and PT students often lack experience and confidence in working with individuals with neurologic disorders (Barta et al., 2022; Greenfield et al., 2015). Since self-efficacy is one predictor of clinical performance, it is recommended that PT education programs include educational approaches that improve self-efficacy with this population (Jones & Sheppard, 2011; Reynolds et al., 2021).

This current study adds to the body of literature and shows that experiential learning with neurologic populations increased PT student self-efficacy with neurologic populations. Therefore, PT education programs should employ experiential learning opportunities during the didactic phase of their curricula to better prepare students for both their full-time clinical experiences and professional clinical practice. Since the Commission on Accreditation in Physical Therapy Education (CAPTE) does not require students to participate in clinical education experiences specifically with individuals with neurologic disorders, PT education programs are encouraged to provide opportunities to engage in experiential learning with neurologic populations before students enter the full-time clinical education phase (CAPTE, 2023). These experiences must involve students working with individuals with neurologic disorders and include activities or assignments focused on developing and practicing key skills, such as examination and intervention techniques. The current research confirmed that assessing educational outcomes in PT students demonstrated the impact of this experiential education intervention. Therefore, it is recommended that educators evaluate their students' outcomes to determine the effectiveness of their instructional approaches.

This study also demonstrated that mastery experiences, or successes, are both a crucial component and potential outcome of experiential learning opportunities aimed at increasing self-efficacy. Instructors are encouraged to work to define mastery or success within a particular experiential learning opportunity. Furthermore, instructors should promote student engagement with these mastery experiences by educating students about the positive outcomes of achieving mastery and incorporating reflection opportunities for students to process their interaction with mastery experiences.

Future research is needed to define what type of mastery experiences are most impactful for students in developing self-efficacy. This research may examine whether students experience greater increases in self-efficacy when they recognize mastery or success in a skill related to their own abilities, or when they observe a positive outcome in a client or patient they are working with. Furthermore, this research may help to more objectively define what constitutes student success or a mastery experience, allowing education program outcomes to be measured in reliable and valid ways.

**Limitations**

This study was limited by examining an experiential learning activity at only one PT education program. This PT education program was located at a private university in the South Atlantic, in a rural setting which may limit the ability to generalize the results to students at different types of institutions and individuals in suburban or urban settings. Since the data from one group of students was studied, and this project lacked a true control, the repeated measures design allowed the researcher to determine the impact of participating in the experiential learning activity. No threats to validity, including selection bias and treatment bias, existed that arise from comparing two groups of students (Creswell, 2005).

This study used a convenience sample. Using a convenience sample, or a non-probability sample, can limit the generalizability of a study's results; however, convenience samples are commonly used in educational and behavioral research (Jager et al., 2017). This study attempted to improve its generalizability by having a homogenous sample and using a repeated measures design. First, this sample represented a homogenous convenience sample via a narrow age range, 21 to 27 years of age, which is representative of the standard age of PT students in the United States (CAPTE, 2024). Furthermore, the MBU DPT education program mirrored the average U.S. DPT program in that it is private and located in the South Atlantic (CAPTE, 2024). Jager et al. (2017) found that a homogenous convenience sample is more generalizable.

Second, thoughtful study design also improves the generalizability of convenience sampling (Emerson, 2021). Through repeated measures design, this study used the data from one group of students over several semesters allowing the group to become its own control (Creswell, 2005). Qualitative data was used to explain and bring credibility to the results of the analyses further.

Though the study instrument has shown to be reliable and valid, and has been used in some studies, it is not well-known how extensively it has been used in research. Its psychometric properties limit the threat of instrumentation bias. Since the project occurred over ten months and concurrently with didactic instruction, student maturation may have influenced data obtained over subsequent semesters (Patten & Newhart, 2018). Additionally, since student participants completed the PSE questionnaire six times, testing bias may have affected their scores on subsequent completions (Patten & Newhart, 2018). Since the data was collected over three consecutive semesters in which students participated in a neuromuscular physical therapy curriculum, history may also have threatened validity in this study.

### Delimitations

Only second-year PT students at MBU who participated in NeuroWellness and the neuromuscular rehabilitation course series were examined in this study. Furthermore, the researcher chose to use a convenience sample and a single study group rather than comparing this group to students in another PT education program who do not use experiential education with individuals with neurological diagnoses. For this project, the instructor of the neuromuscular rehabilitation courses was also the researcher. Lastly, only constructs from self-efficacy theory and one construct of experiential learning theory, success experiences, were examined quantitatively.

## Conclusion

This project addressed the increasing demand for skilled physical therapists to meet the needs of the growing number of adults living with neurologic disorders in the United States, and aimed to fill the research gap on how effectively PT education programs are preparing PT students for this challenge. Consistent with self-efficacy theory and the literature regarding physical therapist self-efficacy with other specific populations, this study found that the participants' overall self-efficacy with neurologic populations and select areas of task-specific self-efficacy significantly improved after participating in eight weeks of an experiential learning activity. There was no significant quantitative relationship between success experiences and self-efficacy, but a common theme of *success experiences* was identified in the narrative reflection statements.

Findings from this study contribute to the body of literature on PT student self-efficacy and experiential learning, help bridge the gap in the literature regarding mastery experiences and self-efficacy in PT students, and provide recommendations for PT education programs for preparing students to work with neurologic populations. PT education programs that incorporate experiential learning with neurologic populations during the didactic phases of their curricula can help ensure students gain sufficient exposure to and develop greater self-efficacy with neurologic populations. Future research should focus on identifying strategies to effectively support student mastery experiences within experiential learning opportunities. As the burden of care for neurologic populations grows, PT education programs must respond with evidence-based methods to prepare future physical therapists for this challenge.

**References**

Alzheimer's Association Report. (2022). 2022 Alzheimer's disease facts and figures. *Alzheimer's & Dementia*, *18*(4), 700–789. https://doi.org/10.1002/alz.12638

American Physical Therapy Association. (2023). *A physical therapy profile: Demographics of the profession, 2021-2022*. https://www.apta.org/contentassets/831610116033426c8f5fd8777dd63c2e/2023_apta_demographics_report.pdf

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W.H. Freeman and Company.

Barta, K., Flores, M., & Edwards, A. (2018). Experiential learning enhances physical therapist student confidence in management of neurologically involved adults and children. *Journal of Physical Therapy Education*, *32*(3), 21–31. https://doi.org/10.1097/JTE.0000000000000040

Bogart, K. R., & Irvin, V. L. (2017). Health-related quality of life among adults with diverse rare disorders. *Orphanet Journal of Rare Diseases*, *12*(1), 177. https://doi.org/10.1186/s13023-017-0730-1

Bradford, E. C. H., Fell, N., Zablotny, C. M., & Rose, D. K. (2023). Essential competencies in entry-level neurologic physical therapist education. *Journal of Neurologic Physical Therapy*, *47*(3), 174. https://doi.org/10.1097/NPT.0000000000000441

Campbell, D. F., Brismée, J.-M., Allen, B., Hooper, T. L., Domenech, M. A., & Manella, K. J. (2023a). Comparison of flex vs. residential clinical education program outcomes: Physical therapy students' self-efficacy, confidence, and clinical competence. *The*

*Journal of Clinical Education in Physical Therapy*, *5*. https://doi.org/10.52214/jcept.v5.9933

Campbell, D. F., Brismee, J.-M., Allen, B., Hooper, T., Domenech, M. A., & Manella, K. J. (2023b). Self-efficacy with telehealth examination: The Doctor of Physical Therapy student perspective. *Philippine Journal of Physical Therapy*, *2*(2), 12–19. https://doi.org/10.46409/002.UDAV8455

Caplan, Z. (n.d.). *U.S. older population grew from 2010 to 2020 at fastest rate since 1880 to 1890*. Census.Gov. Retrieved January 29, 2024, from https://www.census.gov/library/stories/2023/05/2020-census-united-states-older-population-grew.html

Carmeli, E. (2017). Physical therapy for neurological conditions in geriatric populations. *Frontiers in Public Health*, *5*, 333. https://doi.org/10.3389/fpubh.2017.00333

Clarke, L., Tabor, H. K., & Gisondi, M. A. (2023). How are students learning to care for people with disabilities?: Exploring the curriculum design of a sample of disability electives offered by US health professions schools. *Disability and Rehabilitation*, *0*(0), 1–11. https://doi.org/10.1080/09638288.2023.2254694

Commission on Accreditation in Physical Therapy Education. (2023). *Standards and required elements for accreditation of physical therapist education programs*. https://www.capteonline.org/globalassets/capte-docs/2024-capte-pt-standards-required-elements.pdf

Commission on Accreditation in Physical Therapy Education. (2024). *Aggregate program data*. https://www.capteonline.org/globalassets/capte-docs/aggregate-data/2022-pt-aggregate-data.pdf

Creswell, J. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (2nd ed.). Pearson Prentice Hall.

Dean, E., Al-Obaidi, S., De Andrade, A. D., Gosselink, R., Umerah, G., Al-Abdelwahab, S., Anthony, J., Bhise, A. R., Bruno, S., Butcher, S., Fagevik-Olsén, M., Frownfelter, D., Gappmaier, E., Gylfadóttir, S., Habibi, M., Hanekom, S., Hasson, S., Jones, A., LaPier, T., … Wong, W. P. (2011). The first Physical Therapy Summit on Global Health: Implications and recommendations for the 21st century. *Physiotherapy Theory and Practice*, *27*(8), 531–547. https://doi.org/10.3109/09593985.2010.544052

De Vries, N. M., Staal, J. B., van der Wees, P. J., Adang, E. M. M., Akkermans, R., Olde Rikkert, M. G. M., & Nijhuis-van der Sanden, M. W. G. (2016). Patient-centred physical therapy is (cost-) effective in increasing physical activity and reducing frailty in older adults with mobility problems: A randomized controlled trial with 6 months follow-up. *Journal of Cachexia, Sarcopenia and Muscle*, *7*(4), 422–435. https://doi.org/10.1002/jcsm.12091

Dockter, M., Lundeen, H., & Parker, M. G. (2020). An interprofessional geriatric experiential learning experience: Its impact on physical and occupational therapist students. *Journal of Physical Therapy Education*, *34*(1), 33–41. https://doi.org/10.1097/JTE.0000000000000115

Dumurgier, J., & Tzourio, C. (2020). Epidemiology of neurological diseases in older adults. *Revue Neurologique*, *176*(9), 642–648. https://doi.org/10.1016/j.neurol.2020.01.356

Emerson, R. W. (2021). Convenience sampling revisited: Embracing its limitations through thoughtful study design. *Journal of Visual Impairment & Blindness*, *115*(1), 76–77. https://doi.org/10.1177/0145482X20987707

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

Feigin, V. L., Vos, T., Nichols, E., Owolabi, M. O., Carroll, W. M., Dichgans, M., Deuschl, G., Parmar, P., Brainin, M., & Murray, C. (2020). The global burden of neurological disorders: Translating evidence into policy. *The Lancet Neurology*, *19*(3), 255–265. https://doi.org/10.1016/S1474-4422(19)30411-9

Feigin, V. L., Vos, T., Alahdab, F., Amit, A. M. L., Bärnighausen, T. W., Beghi, E., Beheshti, M., Chavan, P. P., Criqui, M. H., Desai, R., Dhamminda Dharmaratne, S., Dorsey, E. R., Wilder Eagan, A., Elgendy, I. Y., Filip, I., Giampaoli, S., Giussani, G., Hafezi-Nejad, N., Hole, M. K., … Murray, C. J. L. (2021). Burden of neurological disorders across the US from 1990-2017: A global burden of disease study. *Journal of the American Medical Association Neurology*, *78*(2), 165–176. https://doi.org/10.1001/jamaneurol.2020.4152

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, *5*(1), 80–92. https://doi.org/10.1177/160940690600500107

Ferreira, É. de M. R., Pinto, R. Z., Arantes, P. M. M., Vieira, É. L. M., Teixeira, A. L., Ferreira, F. R., & Vaz, D. V. (2020). Stress, anxiety, self-efficacy, and the meanings that physical therapy students attribute to their experience with an objective structured clinical examination. *BMC Medical Education*, *20*(1), 296. https://doi.org/10.1186/s12909-020-02202-5

Flowers, M., Yates, C., Fletcher, J., & Lowe, L. (2020). Does dosing of pediatric experiential learning impact the development of clinical reasoning, self-efficacy, and critical thinking in DPT students? *Journal of Allied Health*, *49*(3), 190–196.

Forbes, R., Mandrusiak, A., Smith, M., & Russell, T. (2018a). Training physiotherapy students to educate patients: A randomised controlled trial. *Patient Education and Counseling*, *101*(2), 295–303. https://doi.org/10.1016/j.pec.2017.08.009

Forbes, R., Mandrusiak, A., Smith, M., & Russell, T. (2018b). New-graduate physical therapists' self-efficacy to perform patient education is influenced by entry-level training experiences. *Journal of Physical Therapy Education*, *32*(1), 46. https://doi.org/10.1097/JTE.0000000000000022

Fullard, M. E., Thibault, D. P., Hill, A., Fox, J., Bhatti, D. E., Burack, M. A., Dahodwala, N., Haberfeld, E., Kern, D. S., Klepitskava, O. S., Urrea-Mendoza, E., Myers, P., Nutt, J., Rafferty, M. R., Schwalb, J. M., Shulman, L. M., Willis, A. W., & On behalf of the Parkinson Study Group Healthcare Outcomes and Disparities Working Group. (2017). Utilization of rehabilitation therapy services in Parkinson disease in the United States. *Neurology*, *89*(11), 1162–1169. https://doi.org/10.1212/WNL.000

Gale, J., Alemdar, M., Cappelli, C., & Morris, D. (2021). A mixed methods study of self-efficacy, the sources of self-efficacy, and teaching experience. *Frontiers in Education*, *6*. https://doi.org/10.3389/feduc.2021.750599

Georgiev, G. (n.d.). *Random number generator*. www.gigacalculator.com. Retrieved March 1, 2024, from https://www.gigacalculator.com/calculators/random-number-generator.php

Gooch, C. L., Pracht, E., & Borenstein, A. R. (2017). The burden of neurological disease in the United States: A summary report and call to action. *Annals of Neurology*, *81*(4), 479–484. https://doi.org/10.1002/ana.24897

Greenfield, B., Bridges, P., Phillips, T., Adams, E., & Bullock, D. (2015). Reflective narratives by physical therapist students on their early clinical experiences: A deductive and inductive approach. *Journal of Physical Therapy Education*, *29*(2), 21–31.

Gustafsson, L., Hutchinson, L., Theodoros, D., Williams, K., Copley, A., Fagan, A., & Desha, L. (2016). Healthcare students' experiences of an interprofessional, student-led neuro-rehabilitation community-based clinic. *Journal of Interprofessional Care*, *30*(2), 259–261. https://doi.org/10.3109/13561820.2015.1086730

Ingram, M., Forbes, R., & Jones, A. (2019). Physiotherapy new graduate self-efficacy and readiness to engage in pain assessment and management: A mixed-methods study. *Focus on Health Professional Education*, *20*(3), 65–83.

Ivey, C. K., Bowman, D. H., & Lockeman, K. S. (2018). Changes in physical and occupational therapy students' self-efficacy using an interprofessional case-based educational experience. *Journal of Physical Therapy Education*, *32*(2), 199. https://doi.org/10.1097/JTE.0000000000000055

Jager, J., Putnick, D. L., & Bornstein, M. H. (2017). More than just convenient: The scientific merits of homogeneous convenience samples. *Monographs of the Society for Research in Child Development*, *82*(2), 13–30. https://doi.org/10.1111/mono.12296

Jones, A., Ingram, M. E., & Forbes, R. (2021). Physiotherapy new graduate self-efficacy and readiness for interprofessional collaboration: A mixed methods study. *Journal of Interprofessional Care*, *35*(1), 64–73. https://doi.org/10.1080/13561820.2020.1723508

Jones, A., & Sheppard, L. (2011). Self-efficacy and clinical performance: A physiotherapy example. *Advances in Physiotherapy*, *13*(2), 79–83. https://doi.org/10.3109/14038196.2011.565072

Jones, A., & Sheppard, L. (2012). Developing a measurement tool for assessing physiotherapy students' self-efficacy: A pilot study. *Assessment & Evaluation in Higher Education*, *37*(3), 369–377. https://doi.org/10.1080/02602938.2010.534765

Kaldheim, H. K. A., Fossum, M., Munday, J., Creutzfeldt, J., & Slettebø, Å. (2021). Use of interprofessional simulation-based learning to develop perioperative nursing students' self-efficacy in responding to acute situations. *International Journal of Educational Research*, *109*, 101801. https://doi.org/10.1016/j.ijer.2021.101801

Kim, M. S., Choi, B. K., Uhm, J.-Y., Ryu, J. M., Kang, M. K., & Park, J. (2022). Relationships between nursing students' skill mastery, test anxiety, self-efficacy, and facial expressions: A preliminary observational study. *Healthcare*, *10*(2), Article 2. https://doi.org/10.3390/healthcare10020311

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.

Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (2001). Experiential learning theory: Previous research and new directions. In R. J. Sternberg & L. Zhang (Eds.), *Perspectives on thinking, learning, and cognitive styles.* (2001-16270-009; pp. 227–247). Lawrence Erlbaum Associates Publishers.

Lorio, A., Gore, J., Warthen, L., Housley, S., & Burgess, E. (2017). Teaching dementia care to physical therapy doctoral students: A multimodal experiential learning approach.

*Gerontology & Geriatrics Education*, *38*(3), 313–324. https://doi.org/10.1080/02701960.2015.1115979

Lowe, L., Flowers, M., Fletcher, J., & Yates, C. (2022). The effects of experiential learning on perceived clinical reasoning and self-efficacy of Doctor of Physical Therapy students. *Journal of Physical Therapy Education*, *36*(2), 122–127. https://doi.org/10.1097/JTE.0000000000000225

Machlin, S. R., Chevan, J., Yu, W. W., & Zodet, M. W. (2011). Determinants of utilization and expenditures for episodes of ambulatory physical therapy among adults. *Physical Therapy*, *91*(7), 1018–1029. https://doi.org/10.2522/ptj.20100343

Massey, B. J., Grandeo, J., Favaro, L., Bliss, R., Gagnon, K., & Young, J. L. (2023). Physical therapy students' application of an imaging decision rule for acute knee pain. *Physiotherapy Theory and Practice*, *0*(0), 1–11. https://doi.org/10.1080/09593985.2023.2206482

Pan American Health Organization. (n.d.). *Burden of neurological conditions*. Retrieved February 29, 2024, from https://www.paho.org/en/enlace/burden-neurological-conditions

Paparella-Pitzel, S., Anderson, E. Z., Rothpletz-Puglia, P., & Parrott, J. S. (2021). Exploring physical therapy students' experience of peer learning in a student-run clinic. *Journal of Education and Health Promotion*, *10*, 400. https://doi.org/10.4103/jehp.jehp_188_21

Passmore, A., Persic, C., Countryman, D., Rankine, L., Henderson, M., Tina Hu, Nyhof-Young, J., & Cott, C. (2016). Student and preceptor experiences at an inter-professional student-run clinic: A physical therapy perspective. *Physiotherapy Canada*, *68*(4), 391–397. https://doi.org/10.3138/ptc.2015-87E

Patten, M., & Newhart, M. (2018). *Understanding research methods: An overview of the essentials*. Taylor & Francis.

Paul, A. P., Miner, D. G., & Parcetich, K. M. (2022). Influence of a clinical experiential activity on student confidence in conducting effective fall-risk assessment on older adults. *Gerontology & Geriatrics Education*, *43*(4), 537–550. https://doi.org/10.1080/02701960.2021.1925266

Peiris, C. L., Shields, N., Brusco, N. K., Watts, J. J., & Taylor, N. F. (2018). Additional physical therapy services reduce length of stay and improve health outcomes in people with acute and subacute conditions: An updated systematic review and meta-analysis. *Archives of Physical Medicine and Rehabilitation*, *99*(11), 2299–2312. https://doi.org/10.1016/j.apmr.2018.03.005

Qutishat, D., Muhaidat, J., Mohammad, M., Okasheh, R., Al-Klaifat, L., & Al-Yahya, E. (2021). Exploring attitudes of physiotherapy students towards a community-based project used as a learning tool. *Physiotherapy Theory and Practice*, *37*(1), 115–125. https://doi.org/10.1080/09593985.2019.1619209

Rafferty, M. R., Held Bradford, E. C., Fritz, S., Hutchinson, K. J., Miczak, K., Resnick, A., & Billinger, S. A. (2022). Health promotion and wellness in neurologic physical therapy: Strategies to advance practice. *Journal of Neurologic Physical Therapy*, *46*(2), 103–117. https://doi.org/10.1097/NPT.0000000000000376

Raggi, A., & Leonardi, M. (2015). Burden and cost of neurological diseases: A European North-South comparison. *Acta Neurologica Scandinavica*, *132*(1), 16–22. https://doi.org/10.1111/ane.12339

Remi, R. (n.d.). *Taguette*. Taguette. Retrieved March 15, 2024, from https://app.taguette.org/

Reynolds, K., Bazemore, C., Hanebuth, C., Hendren, S., & Horn, M. (2021). The relationship of non-cognitive factors to academic and clinical performance in graduate rehabilitation science students in the United States: A systematic review. *Journal of Educational Evaluation for Health Professions, 18*. https://doi.org/10.3352/jeehp.2021.18.31

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin*, *130*(2), 261–288. https://doi.org/10.1037/0033-2909.130.2.261

Rosenfeldt, A. B., Greenwood, K., Lubbeck, K., Brown, J., & Iversen, M. D. (2020). The Acute Care Confidence Survey: Examination of the psychometric properties and predictors of performance among students in a large inpatient hospital system. *Journal of Physical Therapy Education (Lippincott Williams & Wilkins)*, *34*(2), 166–171. https://doi.org/10.1097/JTE.0000000000000138

Ryder, M., & Downs, C. (2022). Rethinking reflective practice: John Boyd’s OODA loop as an alternative to Kolb. *The International Journal of Management Education*, *20*(3). https://doi.org/10.1016/j.ijme.2022.100703

Sandstrom, R. (2017). Utilization of ambulatory physical therapy and occupational therapy by the United States population, 2009–2013. *Journal of Allied Health*, *46*(4), 225–231.

Schreiber, J., Moerchen, V. A., Rapport, M. J., Martin, K., Furze, J., Lundeen, H., & Pelletier, E. (2015). Experiential learning with children: An essential component of professional physical therapy education. *Pediatric Physical Therapy*, *27*(4), 356. https://doi.org/10.1097/PEP.0000000000000195

Shavit, R., Kushnir, T., Gottlieb, U., & Springer, S. (2023). Cross-cultural adaptation, reliability, and validity of a Hebrew version of the physiotherapist self-efficacy questionnaire adjusted to low back pain treatment. *Healthcare*, *11*(1), Article 1. https://doi.org/10.3390/healthcare11010085

Shields, N., Bhowon, Y., Prendergast, L., Cleary, S., & Taylor, N. F. (2023). Fostering positive attitudes towards interacting with young people with disability among health students: A stepped-wedge trial. *Disability and Rehabilitation*, *0*(0), 1–8. https://doi.org/10.1080/09638288.2023.2193429

Shields, N., & Taylor, N. F. (2014). Physiotherapy students' self-reported assessment of professional behaviours and skills while working with young people with disability. *Disability & Rehabilitation*, *36*(21), 1834–1839. https://doi.org/10.3109/09638288.2013.871355

Silberman, N. J., Litwin, B., Panzarella, K. J., & Fernandez-Fernandez, A. (2016). High fidelity human simulation improves physical therapist student self-efficacy for acute care clinical practice. *Journal of Physical Therapy Education (American Physical Therapy Association, Education Section)*, *30*(1), 14–24. https://doi.org/10.1097/00001416-201630010-00003

Staunton August YMCA. (n.d.). *Health and wellness*. SAYMCA. Retrieved February 23, 2024, from https://saymca.org/health-wellness/

Stickler, L., Grapczynski, C., & Ritch, J. (2013). Student perceptions of outcomes from participation in physical therapy pro bono clinics: A qualitative study. *Journal of Allied Health*, *42*(1), 46–55.

Stickley, L. A., Bezner, J. R., & Spivey, S. (2019). Development and validation of the self-efficacy of student physical therapist outcomes survey. *Journal of Physical Therapy Education*, *33*(4), 325. https://doi.org/10.1097/JTE.0000000000000111

Tilson, J., Martinez, C., MacDowell, S., D'Silva, L., Howard, R., Roth, H., Skop, K., Dannenbaum, E., & Farrell, L. (2022). Use of the knowledge to action model improved physical therapist adherence to a common clinical practice guideline across multiple settings: A multisite case series. *BMC Health Services Research*, *22*. https://doi.org/10.1186/s12913-022-08796-4

Tsao, C., Aday, A., Almarzooq, Z., Anderson, C., Arora, P., Avery, C., Baker-Smith, C., Beaton, A., Boehme, A., Buxton, A., Commodore-Mensah, Y., Elkind, M., Evenson, K., Eze-Nliam, C., Fugar, S., Generoso, G., Heard, D., Hiremath, S., Ho, J., … Yaffe, K. (2023). Heart disease and stroke statistics—2023 update: A report from the American Heart Association. *Circulation*, *147*(8), e93–e621. https://doi.org/10.1161/CIR.0000000000001123

Van Lankveld, W., Jones, A., Brunnekreef, J. J., Seeger, J. P. H., & Bart Staal, J. (2017). Assessing physical therapist students' self-efficacy: Measurement properties of the Physiotherapist Self-Efficacy (PSE) questionnaire. *BMC Medical Education*, *17*(1), 250. https://doi.org/10.1186/s12909-017-1094-x

Venskus, D. G., & Craig, J. A. (2017). Development and validation of a self-efficacy scale for clinical reasoning in physical therapists. *Journal of Physical Therapy Education*, *31*(1), 14.

Wolden, M., Anderson, B., & Ray, C. (2019). Changes in perceived self-efficacy of physical therapist students following a pediatric experiential learning opportunity. *Pediatric Physical Therapy*, *31*(1), 115–120. https://doi.org/10.1097/pep.0000000000000550

Ypinga, J. H. L., Vries, N. M. de, Boonen, L. H. H. M., Koolman, X., Munneke, M., Zwinderman, A. H., & Bloem, B. R. (2018). Effectiveness and costs of specialised physiotherapy given via ParkinsonNet: A retrospective analysis of medical claims data. *The Lancet Neurology*, *17*(2), 153–161. https://doi.org/10.1016/S1474-4422(17)30406-4

# Appendix A

Physiotherapist Self-Efficacy Questionnaire – Neurologic Subscale

First and Last Initial:

Age:

Gender:

1. I feel adequately prepared to undertake a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

2. I feel that I am able to verbally communicate effectively and appropriately for a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

3. I feel that I am able to communicate in writing effectively and appropriately for a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

4. I feel that I am able to perform subjective assessments for a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

5. I feel that I am able to perform objective assessments for a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

6. I feel that I am able to interpret assessment findings appropriate for a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

7. I feel that I am able to identify and prioritize patients' problems for a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

8. I feel that I am able to select appropriate short and long term goals for a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

9. I feel that I am able to appropriately perform treatments for a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

10. I feel that I am able to perform discharge planning for a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

11. I feel that I am able to evaluate my treatments for a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

12. I feel that I am able to progress interventions appropriately for a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

13. I feel that I am able to deal with the range of patient conditions which may be seen with a neurology caseload.

Not confident at all Very Confident

1 2 3 4 5

# Appendix B

## Permission to Use PSE

**Anne Jones** <anne.jones@jcu.edu.au>
to me, wim.vanlankveld@han.nl, jaap.brunnekreef@han.nl, joost.seeger@han.nl, bart.staal@han.nl

Mon, Feb 6, 2023, 2:56 PM

Dear Martha
I am happy for you to use the tool. If there is anything I can assist you with please don't hesitate to contact me
Regards
Anne

**Dr Anne Jones**
Associate Professor

Head of Physiotherapy

College of Healthcare Sciences
James Cook University, Australia

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1 James Cook Drive Townsville QLD 4811 AUSTRALIA

jcu.edu.au

**Wim van Lankveld** <Wim.vanLankveld@han.nl>
to Jaap, Joost, Bart, me, anne.jones@jcu.edu.au

Tue, Feb 7, 2023, 5:32 AM

Thank you for your interest in de PTSE. I am glad to hear that you want to use t in your research and of course you have my permission.

Good luck with your study and if I can be of assist let me know.

Kind regard,

Wim van Lankveld

...

# Appendix C

## Narrative Reflections

Think about your experience as part of NeuroWellness for two semesters:

1. Describe your most meaningful experience in NeuroWellness.
2. What is one thing you would change about your experience in NeuroWellness?
3. Did your feelings about your abilities as a student physical therapist change throughout NeuroWellness?
4. What is one skill you learned or improved through NeuroWellness?
5. Describe how your practice in physical therapy will be different because of your experience in NeuroWellness.

**Appendix D**

Mary Baldwin University

Informed Consent Document for Participation in Research

Exploring the Impact of Domain-Specific Experiential Learning on Physical Therapy Students' Self-Efficacy in Neurological Practice

Martha D. Cullaty, 540-887-4081, mdcullaty@marybaldwin.edu

You have been asked to participate in a research study at Mary Baldwin University. The purpose of this study is to to examine if participation in a an experiential learning activity with neurological populations relates to self-efficacy with neurologic populations in physical therapy students enrolled in Mary Baldwin University. The purpose of the study, terms of your participation, as well as any expected risks and benefits, must be fully explained to you before you sign this form and give your consent to participate.

Participants will complete the Physiotherapy Self-Efficacy questionnaire two times over the course of three semesters. This will be completed at the beginning and end of each semester, should take approximately 10 minutes to complete each time, and will be completed via a web-based survey tool. You will not be compensated for your participation in this project and will receive no direct benefits. You may benefit from the self-reflection encouraged in completing the questionnaire.

There are no anticipated risks associated with participating in this study. Participation in research is entirely voluntary. You may refuse to participate or may withdraw from participation at any time without penalty or loss of benefits to which you are otherwise entitled. You have the option to have any information or data previously collected destroyed by contacting and informing the researcher at the number below.

If at any time you have questions regarding this research or your participation in it, you should contact the researcher or his/her faculty advisor. If, at any time, you have comments regarding the conduct of this research or if you wish to discuss your rights as a research participant, you may contact the Institutional Review Board at MBU at irb@marybaldwin.edu. You will be given a copy of this consent form to keep.

I have read and understand the above description of the research. Anything I did not understand was explained by the researcher and all of my questions were answered to my satisfaction. I agree to participate in this research. I acknowledge that I have received a personal copy of this consent form.

Signature of Participant (age 18 and older)/Date Signature of Investigator/Date

# Appendix E

MARY BALDWIN
UNIVERSITY

July 11, 2023

Protocol: REF20230501-Cullaty
Level: Expedited
Status: Approved

Dear Martha,

I am pleased to inform you that your requested proposal entitled **Exploring the Impact of Domain-Specific Experiential Learning on Physical Therapy Students' Self-Efficacy in Neurological Practice** has been reviewed and approved by the Institutional Review Board of Mary Baldwin University. You may begin collecting data in accordance with your application.

Approval for this proposal expires one year from the date of this letter [July 11, 2024]. If you wish to continue the study beyond this period, you must submit a Continuing Review Form, available on the MBU IRB web page, at least one month before expiration of your approval.

In addition, you must notify the MBU IRB IMMEDIATELY if any serious adverse events occur that are related to study activities.

Best wishes for a productive research study.

Sincerely,

Brian Miller
Chair, Institutional Review Board
Mary Baldwin University

IRB00004838 FWA00008717 IORG0004078
Mary Baldwin University, Staunton, VA

Radford UNIVERSITY

Institutional Animal Care and Use Committee / Institutional Review Board

January 11, 2024

| | |
|---|---|
| TO: | Martha Cullaty |
| RE: | Radford Acknowledgment of IRB Approval |
| STUDY TITLE: | Exploring the Impact of Domain-Specific Experiential Learning on Physical Therapy Students' Self-Efficacy in Neurological Practice |
| IRB REFERENCE #: | REF20230501-Cullaty |

The Radford University Institutional Review Board (IRB) acknowledges the Mary Baldwin University IRB review and approval of the above-referenced study.

If changes are made to the project, a copy of the Mary Baldwin University IRB-approved modification application and approval letter are to be forwarded to the Radford University Research Compliance Office-IRB.

The Radford University IRB would like to thank you for your hard work and for keeping us informed.

Good luck with this project!

Anna Marie Lee, MHA, CPIA
Research Compliance Manager
Radford University
Irb-iacuc@radford.edu
https://www.radford.edu/content/research-compliance/home.html

## Appendix F

## Codebook

| Question/Issue | Variable Name | Values* | Data Type |
|---|---|---|---|
| *Any question that is left blank will be coded in SPSS as "System Missing" | | | |
| **Physiotherapy Self-Efficacy Questionnaire** | | | |
| 1. Prepared to undertake neurology caseload | **PREP** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| 2. Can verbally communicate for neurology caseload | **V_COMM** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| 3. Can communicate in writing for neurology caseload | **W_COMM** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| 4. Perform subjective assessments for neurology caseload | **SUBJ** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| 5. Perform objective assessments for neurology caseload | **OBJECT** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| 6. Interpret assessment findings for neurology caseload | **INT_ASSESS** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| 7. Identify and prioritize patient problems for neurology caseload | **PT_PROB** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| 8. Select goals for neurology caseload | **GOAL** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident | Categorical (ordinal) |

| | | | |
|---|---|---|---|
| | | 5: very confident | |
| 9. Perform treatments for neurology caseload | **TREAT** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| 10. Perform discharge plan for neurology caseload | **DC_PLAN** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| 11. Evaluate treatments for neurology caseload | **EVAL_TREAT** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| 12. Progress interventions for neurology caseload | **PROG_INT** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| 13. Deal with range of conditions with neurology caseload | **RANGE** | 1: not confident at all<br>2: not confident<br>3: somewhat confident<br>4: confident<br>5: very confident | Categorical (ordinal) |
| **Outcome of Mastery Experience** | | | |
| 1. PT student measures change in client outcome measure | **SUCCESS** | 0: no client change or negative change<br>1: one semester positive client change<br>2: two semesters positive client change | Categorical (ordinal) |
| **Coded Dependent Variables** | | | |
| 1. Feelings of preparedness for working with neurologic populations | **PREP_RC** | Average of total answers to the following questions: 1,13 | Continuous (interval) |
| 2. Confidence in communication skills with neurologic population | **COMM** | Average of total answers to the following questions: 2,3 | Continuous (interval) |
| 3. Confidence in exam skills with neurologic population | **EXAM** | Average of total answers to the following questions: 4,5 | Continuous (interval) |

| | | | |
|---|---|---|---|
| 4. Confidence with synthesis and evaluation skills with neurologic population | **SYNTH_EVAL** | Average of total answers to the following questions: 6,7,8,10,11 | Continuous (interval) |
| 5. Confidence with intervention skills | **INTERV** | Average of total answers to the following questions: 9,12 | Continuous (interval) |
| 6. Self-efficacy with neurologic populations | **TOTAL** | Sum of total scores of questions: 1-13<br><br>13-65 | Continuous (interval) |
| **Participation in Semesters With and Without Experiential Learning Activity** | | | |
| 1. Participated in semesters with and without experiential learning activity | **PARTICIPATE** | 0: semester 1(no EL)<br>1: semester 2 (EL)<br>2: semester 3 (EL) | Categorical (ordinal) |

## Appendix G

## Data Analysis Table

| RQ1: Is PT student participation in a neurologic experiential learning activity associated with students' self-efficacy when working with neurologic populations? | | | | | | |
|---|---|---|---|---|---|---|
| | **Hypotheses** | **IV(s)** | **IV(s) Data** | **DV(s)** | **DV Data** | **Stat Test** |
| H1.1 a | PT students who participate in a neurologic experiential learning activity will have significantly improved overall self-efficacy with neurologic populations. | **PARTICIPATE** | 1: first semester (no EL)<br>2: second semester (EL)<br>3: third semester (EL)<br>Categorical (ordinal) | **TOTAL** | Sum of total scores of questions: 1-13<br>13-65<br>Continuous (Interval) | **2x3 Repeated Measures ANOVA** |

| | | | | | | |
|---|---|---|---|---|---|---|
| H1.2 a | PT students who participate in a neurologic experiential learning activity will have significantly improved feelings of preparedness for working with neurologic populations. | **PARTICIPATE** | 1: first semester (no EL)<br>2: second semester (EL)<br>3: third semester (EL)<br>Categorical (ordinal) | **PREP** | Difference in scores (pre- and post-): Average of total answers to the following questions: 1,13<br>Continuous (Interval) | **2x3 Repeated Measures ANOVA** |
| H1.3 a | PT students who participate in a neurologic experiential learning activity will have significantly increased confidence in their communication skills for working with neurologic populations. | **PARTICIPATE** | 1: first semester (no EL)<br>2: second semester (EL)<br>3: third semester (EL)<br>Categorical (ordinal) | **COMM** | Difference in scores (pre- and post-):<br>Average of total answers to the following questions: 2,3<br>Continuous (Interval) | **2x3 Repeated Measures ANOVA** |
| H1.4 a | PT students who participate in a neurologic experiential learning activity will have significantly increased | **PARTICIPATE** | 1: first semester (no EL) | **EXAM** | Difference in scores (pre- and post-): | **2x3 Repeated Measures ANOVA** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | confidence in performing examination skills for working with neurologic populations. | | 2: second semester (EL)<br>3: third semester (EL)<br>Categorical (ordinal) | | Average of total answers to the following questions: 4,5<br>Continuous (Interval) | |
| H1.5 a | PT students who participate in a neurologic experiential learning activity will have significantly increased confidence in their synthesis and evaluation skills for working with neurologic populations. | **PARTICIPATE** | 1: first semester (no EL)<br>2: second semester (EL)<br>3: third semester (EL)<br>Categorical (ordinal) | **SYNTH_EVAL** | Difference in scores (pre- and post-):<br>Average of total answers to the following questions: 6,7,8,10,11<br>Continuous (Interval) | **2x3 Repeated Measures ANOVA** |

| | | | | | | |
|---|---|---|---|---|---|---|
| H1.6 a | PT students who participate in a neurologic experiential learning activity will have significantly increased confidence in skillfully providing interventions with neurologic populations. | **PARTICIPATE** | 1: first semester (no EL)<br>2: second semester (EL)<br>3: third semester (EL)<br>Categorical (ordinal) | **INTERV** | Difference in scores (pre- and post-):<br>Average of total answers to the following questions: 9,12<br>Continuous (Interval) | **2x3 Repeated Measures ANOVA** |
| RQ2: Is the amount of PT student engagement with success experiences associated with a PT student's total self-efficacy score when working with neurologic populations? | | | | | | |
| H2.1 a | PT students who engage with more success experiences during a neurologic experiential learning activity will have significantly improved total self-efficacy scores. | **SUCCESS** | 0: no client change or negative change<br>1: one semester positive client change<br>2: two semesters positive client change | **TOTAL** | Semester 3 sum of total scores of questions: 1-13<br>13-65<br>Continuous (Interval) | **One-way ANOVA** |

## Appendix H

### Qualitative Codes and Themes

| Code | Theme | Number of Statements | Theoretical Basis | Selected Quotes |
|---|---|---|---|---|
| Concrete Experiences | Concrete/practical | 44 | Experiential Learning | *Through my hands-on experience…I was able to gain valuable knowledge and skills that boosted my confidence for providing effective care.*<br><br>*I have definitely improved my ability to assist the legs and help with weight shifts during gait.*<br><br>*Getting real-life exposure…has greatly improved my confidence as a physical therapy student.*<br><br>*NeuroWellness gave me practice working with clients one on one for an entire hour.*<br><br>*Nothing we do in the classroom or lab periods is up to par with the learning experience that our sessions at the YMCA provide…My transfer skills came to life during NeuroWellness.* |
| Confidence Mindset | Affective states/emotional mindset | 37 | Self-Efficacy Theory | *It changed my perspective of not feeling like I needed to be an expert of neuro.*<br><br>*NeuroWellness drastically improved my feelings about heading into my second clinical and feeling more capable of working with neurologic populations.* |

| | | | | |
|---|---|---|---|---|
| | | | | *…NeuroWellness has exposed me to working with a neuro population and helped me gain confidence in this area.* |
| Success Experiences | Mastery/success | 30 | Self-Efficacy Theory | *Being a part and witnessing her progressing and positive attitude was [incredibly] rewarding.*<br><br>*…It was just a very fulfilling thing to experience this and know that we made some impact on their life.*<br><br>*It has shown me…how satisfying it is to help someone progress through therapy.*<br><br>*Seeing where she is now reminds me of the great work we do as Student Physical Therapists.* |
| Active Experimentation | Active experimentation /adaptability | 26 | Experiential Learning | *I believe that I was able to find the right balance between assisting the patient and allowing them to exert their effort, while providing guidance and external cues as needed to facilitate proper gait mechanics.*<br><br>*One skill I have learned through NeuroWellness is how to adapt.*<br><br>*This experience allowed my partner and I…to put our thinking caps on, be adaptable with a backup plan (and sometimes on the spot), and ask for help when needed.* |

| | | | | |
|---|---|---|---|---|
| Peer Modeling | Vicarious experiences | 23 | Self-Efficacy Theory | *I learned important lessons from both partners that I had. My partner during the first semester helped me step out of my comfort zone…Second semester, I had the opportunity to collaborate more with my partner to come up with creative ways to accomplish a task.*<br><br>*I enjoyed working with my classmates and learning from them to come up with interventions that I can use in clinical rotations and post-graduation.*<br><br>*This challenged me as I had to lead this other student with the plan of care and interventions. I was able to do so…and it showed me that I was capable of a lot more than I thought.* |
| Personal Connections | Affective states/emotional mindset (self) | 14 | Self-Efficacy Theory | *Going forward, I think my practice will always allow room for interpersonal connection.*<br><br>*The most meaningful experience I had in NeuroWellness was the connections I made with the participants.*<br><br>*It also allowed me to develop a connection with the participants, which I believe resulted in trust between the two of us.* |
| Participant Motivation | Affective states/emotional mindset (self plus others) | 14 | Self-Efficacy Theory | *I think because she was very motivated to walk that it gave us motivation as her* |

| | | | | |
|---|---|---|---|---|
| | | | | *SPTs to work even harder to reach her goal.*<br><br>*Her motivation was also something I will never forget as she had someone in the gym come up to her and mention how much of an inspiration she is still working towards her goal of walking despite what she may have been through.* |
| Responsibility to Neurologic Population | | 11 | | *I changed my thought process about how much I could impact the local community through knowledge we have learned in school and effort to put together a good session for these people.*<br><br>*…There is a huge need to provide service to those with Neuro conditions even in a community as small as Staunton.* |
| Mentor Modeling | Verbal persuasion | 7 | Experiential Learning | *Through my hands-on experience and guidance from my professor and the trainers at the YMCA, I was able to gain valuable knowledge and skills that boosted my confidence…*<br><br>*I saw myself grow from having to check in with my professor about every intervention, to having the confidence to change interventions and come up with different activities.* |
| Reflection | Reflective observation | 5 | Experiential Learning | *I learned a lot about myself as a physical therapist…*<br><br>*It provided me with valuable insights…that I can apply in* |

| | | | | |
|---|---|---|---|---|
| | | | | *different aspects of patient care and that I can use in my [next clinical] rotation.* |
| Need for More Time/Experience | | 4 | | *I would still say I would like more experience to feel even more comfortable working with this population.*<br><br>*One thing I would change about my experience in NeuroWellness is to have additional visits to monitor my patients' progress over an extended period.* |
| Total | | 215 | | |