The Home Program Adherence Tackle Box:
A Fishing-Themed Toolkit for Rehabilitation Clinicians

by

Nicholas Riveland, MOTS

Colter Pettit, MOTS

Advisor: Anne Haskins

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APPROVAL

This Scholarly Project Paper, submitted by Nicholas Riveland, MOTS and Jeffrey "Colter" Pettit, MOTS in partial fulfillment of the requirement for the Degree of Master of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

Faculty Advisor

4/28/2020

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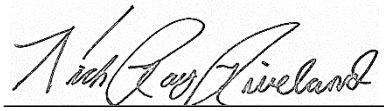

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ABSTRACT

Title: The Home Program Adherence Tackle Box: A Fishing Themed Toolkit for Rehabilitation Professionals.

Jeffrey Pettit, MOTS, Nicholas Riveland, MOTS & Anne Haskins, PhD, OTR/L. Department of Occupational Therapy, University of North Dakota School of Medicine and Health Sciences, 1301 N Columbia Rd, Grand Forks, ND 58203--2898

Background: Home programs (HPs) are an important part of the rehabilitation experience and are regularly recommended by occupational therapy practitioners (OTPs) and other rehabilitation clinicians for continuation and supplementation of care, to address a client's continual needs at home and in the community (DeForge et al., 2008; Donoso Brown, & Fichter, 2017; Emmerson et al., 2017; Picha, & Howell, 2018; Proffitt, 2016). Home programs created by rehabilitation professionals for clients typically include therapeutic exercises, activities, and lifestyle behavior modifications to compliment treatment and/or discharge recommendations. Issuing home programs is an established standard of care to help clients meet targeted client goals and outcomes (Proffitt, 2016). The data in the literature suggests that rates of adherence to rehabilitation home programs are lower than acceptable ranging from 40-70% across various populations (DeForge et al., 2008; Donoso Brown, & Fichter, 2017; Emmerson et al., 2017; Picha, & Howell, 2018; Proffitt, 2016). According to the World Health Organization (2003), adherence is considered a key factor influencing treatment effectiveness and optimal client outcomes, especially when considering lifestyle interventions. Adherence is a complex and multifactorial issue, which may explain why it goes largely unaddressed by practitioners due to the many associated barriers of healthcare systems, providers, and clients (WHO, 2016). Currently, literature is limited regarding occupational therapy's role in assessing and addressing barriers to home program adherence.

Purpose: The purpose of this scholarly project was to develop a user-friendly guide and toolkit designed for rehabilitation practitioners to therapeutically "tackle" the complex, multifactorial challenges and barriers associated with a client's adherence to HPs, many of which are potentially modifiable with targeted interventions (Picha, & Howell, 2018).

Methods: The contributing developers of this product conducted an extensive literature review to determine: (1) current use and prescription of HPs in rehabilitation; (2) barriers and facilitators of adherence to HPs; (3) current use of adherence tools used in rehabilitation; and (4) best practice principles for promoting adherence for HPs.

Conclusion: The results of the literature review guided the development of the product, the *Home Program Adherence Tackle Box.* The *Home Program Adherence Tackle Box* contains client-centered strategies and critical guiding resources that OTPs, and other clinical rehabilitation enthusiasts, can use to skillfully facilitate client adherence to home program recommendations to enhance one's function and occupations in life. This themed booklet includes evidence-based strategies and intervention resources to help efficiently guide rehabilitation professionals in holistically promoting HP adherence. It includes the development, collection, and organization of a multitude of relevant "tackle tools.

Chapter I

Introduction

Significance of Identified Problem

Occupational therapy practitioners (OTPs) along with other rehabilitation professionals strive to deliver evidence-based practice (EBP) that consists of current evidence from literature, client preference, and clinical expertise and judgment to diverse populations in a wide array of rehabilitation settings (Law & MacDermid, 2008). Through skilled therapy services, rehabilitation professionals use therapeutic interventions to facilitate participation in health-promoting behaviors and daily occupations. The use of EBP often determines the quality of services provided to clients and the credibility of the profession from which the interventions stemmed (Stronge & Cahill, 2012).

As part of best practice, home programs are often designed and prescribed by OTPs and other rehabilitation professionals to supplement and facilitate self-management, as well as the continuation of clinical care at home and in the community (DeForge et al., 2008; Donoso Brown & Fichter, 2017; Emmerson, et al., 2017). Home programs often include therapeutic exercise, activity, occupations, and other lifestyle behavior modifications that are used to enhance clinical outcomes and promote quality of life for clients (Picha & Howell, 2018; Proffitt, 2016). There are many well-established benefits of using home programs to maximize a client's recovery cited in the literature including increased clinical outcomes of a client's functional abilities, and enhanced self-

management and maintenance capabilities (Jack et al., 2010; Jansons et al., 2017; Ouegnin & Valdes, 2018; Picha & Howell, 2018; Proffitt, 2016).

In order for a therapist-prescribed home program for diverse populations to be effective, it is a requisite that a client must follow through or adhere to the therapist's recommendations (Jack et al., 2010; Jansons et al., 2017; Ouegnin & Valdes, 2018; Picha & Howell, 2018). Adherence rates to home programs in current literature are substantially low, ranging from 40-70% across a wide range of populations (DeForge et al., 2008; Donoso Brown and Fichter, 2017; McLean et al., 2017; Simek et al., 2012). This data suggest that adherence rates are well below acceptable levels and an issue of concern. There are many associated consequences of low adherence including increased cost of healthcare, lower quality of life for clients, decreased client and clinical outcomes, lower clinician effectiveness, and overall decreased treatment effectiveness (Geraedts et al., 2014; Jack et al., 2010; McLean et al., 2018; WHO, 2003). Contrarily, increased client adherence to home programs have shown to be a cost effective method for improving a client's quality of life, increased engagement in physical and occupational function, reduction in psychosocial illnesses, and continued maintenance of desirable healthy behaviors (McLean et al., 2017; Ouegnin & Valdes, 2018; Simek et al., 2012; WHO, 2003). McLean et al. (2008) suggested that therapist-targeted intervention actions for increasing adherence may be a more important for increased clinical outcomes, than improving the intervention components.

Adherence is a multifactorial issue that often goes unaddressed by clinicians (Proffitt, 2016; McLean et al., 2017). This complex concept has associated barriers that involve client, provider, and healthcare system factors that influence home program

adherence (Babatunde et al., 2017; Radomski, 2011). For many rehabilitation professionals, these barriers go unnoticed and unaddressed due to lack of knowledge, skills, tools, and resources available to identify and use targeted interventions (Babatunde et al., 2017). However, the ability of a client to adhere to agreed-upon recommendations is crucial for optimal clinical outcomes. This makes it important for therapists to be well educated and trained in adherence promoting strategies to assess and promote adherence of home programs (Babatunde et al., 2017). Evidence-based resources are needed to facilitate consistent adherence promoting behaviors from clinicians.

We conducted a literature review on topics relating to home program use in rehabilitation, adherence to home programs, barriers and facilitators of adherence to home programs, and adherence tools and strategies currently being used in practice. Following completion of our literature review, we identified current barriers and facilitators of home program adherence, as well as practitioners' knowledge and use of adherence promoting strategies, and gaps relating to tools and resources available for adherence promoting therapist behaviors. The need for a therapist focused home program adherence enhancing toolkit was evident to address the current problems associated with low client adherence which included limited therapist knowledge, skills, tools, and resources. Additionally, the literature revealed a real need to address current gaps related to adherence evidence translation into practice.

Theoretical Base

The guiding framework for the structure and content of our product was inspired by Mary Radomski's Ecological Model of Adherence in Rehabilitation (Radomski, 2007; 2011). This model was adopted, and then adapted with inclusion of healthcare system

factors found within our research and a fishing theme to match our product. By reorganizing and revamping the model, we produced the Ecological Model of Home Program Adherence. In this model, the person and adherence are centralized, and under the premise that adherence is a multifactorial issue for rehabilitation populations related to client, intervention, provider, and healthcare system factors (Radomski, 2011). These factors are placed within the social, technological, and environmental contexts (Radomski, 2011). Autonomy, choice, client motivation, and other self-determination constructs are prioritized in this model (Radomski, 2007; 2011). Several other well-established theoretical models were used in the development of the overall product and tools including, the Health Belief model, Self-Efficacy Theory, andragogy (adult learning), and other motivational theories. Theory was consistently used during the creation of our product and has been referenced throughout the product itself.

Product

The product, *The Home Program Adherence Tackle Box* is a user-friendly guide and toolkit designed for rehabilitation practitioners to strategically address the complex, multifactorial challenges associated with client home program adherence. The intended population chosen for the product was, occupational therapists, physical therapists, and other allied rehabilitation professionals working with clients including a wide range of acute and chronic conditions in rehabilitation settings. The product was created with the intent of providing client-centered strategies and critical guiding resources that OTPs and other clinical rehabilitation specialists can use to facilitate client adherence to home program recommendations to enhance one's function and occupations in life.

This themed guide booklet includes evidence-based strategies and intervention

resources to help efficiently guide rehabilitation professionals in holistically promoting adherence. The product includes the development, collection, and organization of a multitude of relevant tools and educational resources for promoting adherence to home programs for a wide variety of rehabilitation populations and settings. The guidebook and tackle box takes the user through the background and general adherence strategies organized by TACKLE TIPS. Rehabilitation professionals can use the guidebook and tackle box along with his or her clinical reasoning to effectively and systematically tackle specific issues of adherence to home programming.

Key Terms

- **Ecological Model of Home Program Adherence***:* This model considers that adherence is a multifactorial issue for rehabilitation populations and is related to client, intervention, provider, and healthcare system factors within the context of social, technological, and environmental factors that can act as either barriers or facilitators to adherence (Radomski, 2011).
- **Client/patient:** An individual seeking or receiving professional rehabilitation services following an injury or illness.
- **Client-Centered:** "An approach to service that incorporates respect for and partnership with clients as active participants in the therapy process" (Schell, Scaffa, Gillen, & Cohn, 2014, p. 54).
- **Occupational Therapy** "The therapeutic use of everyday life activities (occupations) with individuals or groups for the purpose of enhancing or enabling participation in roles, habits, and routines in home, school, workplace, community

and other settings" (American Occupational Therapy Association [AOTA], 2014, S1).

- **Occupational Therapy Practitioners:** Refers to both occupational therapists and occupational therapy assistants.
- **Rehabilitation Professionals:** Refers to occupational therapists, physical therapists, and other allied healthcare professionals working in rehabilitation settings**.**
- **Evidence-based practice (EBP):** Includes consideration of current evidence from literature, client preference, and clinical practitioner expertise and judgment to promote optimal client outcomes (Law & MacDermid, 2008).
- **Evidence-based rehabilitation (EBR):** A practitioners awareness of current evidence, utilization of consultation, specification of judgment to client's situation, and creativity along with insight due to the complex nature of practice and application of EBP in the rehabilitation setting (Law & MacDermid, 2014).
- **Home Programs:** Typically include therapeutic exercises, activities, and lifestyle behavior modifications to compliment treatment and/or discharge recommendations prescribed by rehabilitation professionals. Home programs may also include activity and exercise precautions to enhance a client's safety.
- **Adherence:** Initiation and completing, or following through on, therapist prescribed treatment and behavioral recommendations (Radomski, 2011).
- **Occupational Performance:** *"*The accomplishment of the selected occupation resulting from the dynamic trans-action among the client, the context and environment, and the activity or occupation" (American Occupational Therapy

Association [AOTA], 2014, S14).

Introduction to Chapters

This scholarly project is distributed into several sections that provide a skeleton of the steps taken in the construction of the product. Chapter II is a literature review that offers a broad explanation of current literature on the identified topic. After the literature review, Chapter III the methodology is comprised of descriptions of the overall decision-making process and steps taken in the construction of the product. Chapter IV is an introduction to the product, and the final product is included in the appendix. The project is then summarized as a whole in the conclusion located in Chapter V, and a list of references and the appendix follows.

CHAPTER II

Review of Literature

Occupational Therapy Overview

Occupational therapy is "the therapeutic use of everyday life activities (occupations) with individuals or groups for the purpose of enhancing or enabling participation in roles, habits, and routines in home, school, workplace, community and other settings" as defined within the Occupational Therapy Practice Framework: Domain & Process (OTPF) (American Occupational Therapy Association [AOTA], 2014, S1). Occupational therapy practitioners (OTPs) strive to facilitate a person's engagement in everyday occupations while considering the integral interactions between the person, his or her valued life occupations, and the context in which a person's tasks are performed (AOTA, 2014). It is the belief of the profession that engagement in meaningful occupations will positively impact a person's holistic health, well-being, and participation in life (AOTA, 2014). Occupational therapy practitioners offer skilled therapy services through a collaborative approach to promote improvement of a person's occupational performance by addressing and facilitating change in performance skills, client factors, and/or the context. Through the skilled process of activity (occupational) analysis, OTPs are trained to evaluate the demands that a given activity places on a person, and are thus able to grade (appropriately change) and adapt the activity to meet the unique needs of an individual (AOTA, 2014).

The occupational therapy profession uses occupation-based interventions to serve diverse populations across the lifespan in a wide array of traditional and non-traditional settings. The common types of interventions utilized in the field of occupational therapy are occupations and activities, preparatory tasks and methods, as well as education and training (AOTA, 2014). These interventions are used to facilitate participation in a person's daily occupations to promote health and well-being, as well as to foster recovery from dysfunction related to disease and injury (AOTA, 2014). Occupations and activities are used by OTPs "as interventions for specific clients and designed to meet therapeutic goals and address the underlying needs of the mind, body, and spirit of the client" (AOTA, 2014, S 29). Preparatory methods and tasks are described in the OTPF as "methods and tasks that prepare the client for occupational performance, used as part of a treatment session in preparation for or concurrently with occupations and activities or provided to a client as a home-based engagement to support daily occupational performance" (AOTA, 2014, S29). Education is used by OTPs to enhance a client's knowledge about health and well-being as well as participation in occupation to elicit behavior, habit, and routine change (AOTA, 2014). Training is utilized by OTPs to promote development of clients' specific skills that are needed to reach client-oriented functional goals and participation in meaningful occupations (AOTA, 2014). OTPs serve people with chronic and acute conditions in a variety of rehabilitative healthcare settings including, but not limited to hospitals and outpatient clinics. Services are also commonly rendered in community settings such as a person's home. Individuals receiving occupational therapy services are usually considered *clients or patients,* dependent upon the setting.

Evidence-based practice.

The occupational therapy profession strives to deliver evidence-based practice (EBP), which includes consideration of current evidence from literature, client preference, and clinical expertise and judgement to promote optimal client outcomes (Law & MacDermid, 2008). Through adaptation of concepts that come from EBP, OTPs can use clinical expertise combined with clinical evidence and gear rehabilitation practice in a client-centered manner to promote current best methods of treatment (Law & MacDermid, 2014). For enhanced client health outcomes, it is imperative that OTPs adapt EBP concepts and use evidence within the complex decision making needed during rehabilitation practice to deliver evidence-based rehabilitation (EBR) (Law & MacDermid, 2014). Evidence-based rehabilitation includes awareness of current evidence, utilizes consultation, specifies judgement to client's situation, and creativity along with insight due to the complex nature of practice and application of EBP in the rehabilitation setting (Law & MacDermid, 2014). According to Stronge and Cahill (2012), though EBP is effective in clinical care, it is not used sufficiently in practice by OTPs. The most common barriers in clinical settings to EBP included, lack of time, lack of fieldwork educators using EBP, difficulties finding evidence, and the feeling that previous work experience was more important than research findings (Stronge & Cahill, 2012). Stronge and Cahill (2012) suggested that by engaging in EBP, students and OTPs will determine the future credibility of the occupational therapy profession and establish better therapy practices for patients that will ultimately outcome in higher quality of services.

Home Programs

OTPs, along with other rehabilitation professionals, use home programs and discharge recommendations for continuation and supplementation of care, as a part of best practice (DeForge, Cormack, Byrne, Hillier, Mackenzie, & Gutmanis, 2008; Donoso Brown & Fichter, 2017; Emmerson, Harding, & Taylor, 2017). Home programs often supplement direct clinical treatment and play an important part in addressing a client's continual needs at home (Donoso, 2017; Picha & Howell, 2018; Proffitt, 2016). OTPs frequently prescribe these programs because one-to-one or direct services covered by insurance are often inadequate to meet targeted client goals and outcomes (Proffitt, 2016), especially long-term self-management.

Home programs created by OTPs for clients typically include therapeutic exercises, activities, and lifestyle behavior modifications to compliment treatment and/or discharge recommendations. They may also include things like activity and exercise precautions to enhance a client's safety. Home programs have traditionally included written recommendations delivered as paper handout to clients, however a number of settings are also using technology-based home programs on devices such as computers or mobile phones (Donoso Brown & Fichter, 2017; Lambert, Harvey, Avdalis, Chen, Jeyalingam, Pratt, … Lucas, 2017). To date, paper versions are more commonly used by occupational therapists, who have reported to complement the handout with visual demonstration or direct training with feedback, as well as discussion of how to incorporate activities into routine (Donoso Brown & Fichter, 2017; Proffitt, 2016).

Proffitt (2016) found that OTPs perceived benefits of using home programs are to actively engage client in his or her recovery, give client control over his or her recovery,

and help reinforce carryover after leaving the clinic. Regarding client factor benefits, Proffitt (2016) found OTPs felt that home programs led to a reduction in deficits, prevention of functional decline, and increased motor functioning due to more opportunity for practice out of the clinic setting. Such programs ideally will "maximize a patient's recovery and ensure maintenance of therapeutic gains produced during supervised treatment" (Ouegnin & Valdes, 2018, para. 1). According to Picha and Howell (2018), home exercise programs (HEP) are the standard of care for musculoskeletal disorders and correspond to best practice recommendations by clinicians. However, adherence is an important requisite for the effectiveness of home exercise programs for any population whether managing orthopedic, neurological, or other chronic and acute conditions (Jack, Mclean, Moffett, & Gardiner, 2010; Jansons, Robins, O'Brien, & Haines, 2017; Ouegnin & Valdes, 2018; Picha & Howell, 2018).

Adherence.

Adherence has been defined by the World Health Organization (WHO) as "the extent to which a person's behaviour corresponds with agreed recommendations" such as lifestyle changes "from a health care provider" (World Health Organization [WHO], 2003, p. 18). The term, *adherence* has been chosen to responsibly replace *compliance* as a descriptor for following and maintaining therapy recommendations because of the latter term's condescending connotation, implying that clients should obey the "orders" of the therapist (Radomski, 2011; WHO, 2003). For the context of this literature review, adherence refers to initiating and completing, or following through on, treatment and behavioral recommendations (Radomski, 2011). True to the collaborative and mutual approach taken by OTPs with their clients as laid out in the profession's practice

framework, a client's adopted behavior should be a result of internal motivation and active collaboration with therapist rather than from an external locus of control (AOTA, 2014; Radomski, 2011). To reiterate, the client should have control and choice in the therapeutic process, and the term *adherence* more accurately represents this stance.

Adherence rates.

An individual's ability to adhere to agreed recommendations of home programming is crucial for effective clinical health outcomes (DeForge et al., 2008; McLean, Holden, Potia, Gee, Mallett, Bhanbhro, . . . & Haywood, 2017; Peek, Sanson-Fisher, Mackenzie, & Carey, 2016; WHO, 2003). Authors of current literature have suggested that rates of adherence to home programs are generally wide ranging across countries and populations receiving therapy services, with many populations exhibiting alarmingly low adherence rates (Geraedts, Zijlstra, Zhang, Bulstra, & Stevens, 2014; Jack et al., 2010; WHO, 2003). According to a survey conducted by Donoso Brown and Fichter (2017), OTPs perceived that estimated adherence rates expected from patients using a home program to recover from stroke to be from 50-60%. Although the study design by Donoso Brown and Fichter (2017) may have limited the validity of this data from an online survey, similar or worse rates appear in other research with more robust designs. Authors of a recent systematic review reported the average rate of adherence as 67% for physiotherapist-prescribed home exercise programs for adults with a range of 33-93% (Peek et al., 2016). Certain studied populations have shown consistently lower adherence rates, such as older adults (DeForge et al., 2008; Simek, Mcphate, & Haines, 2012). DeForge et al. (2008) found that clients discharged from a geriatric rehabilitation unit fully adhered to home exercise plan at a rate of 59%, while 31% of clients at least

partially adhered to recommendations. In a systematic review, it was estimated that 21% of older adults fully adhered to falls prevention home programs (Simek et al., 2012). In yet another study, authors cited "50-70% of patients are non-adherent or only partially adherent to home physiotherapy programs" (Peek et al., 2017, p. 128). This data suggests that rates of adherence to home programs are lower than acceptable and present an issue of concern.

Consequences of low adherence.

The deeper and more concerning implication is that client and clinical outcomes in the nation and around the globe are negatively impacted when there is low treatment adherence to home programs (Argent, Daly, & Caulfield, 2018; DeForge et al., 2008; Jack et. al, 2010). The WHO (2003) predicted that chronic diseases would represent over 65% of all the diseases worldwide by 2020 and noted how this will further accent the consequences of low adherence. The cost of healthcare, therapeutic relationships, and a clinician's effectiveness may be undesirably affected by non or low adherence (Argent et al., 2018; McLean et al., 2017). Contrarily, high exercise adherence has been shown to positively impact clinical and client outcomes (McLean et al., 2017). According to the WHO (2003), adherence is considered a key factor influencing treatment effectiveness and optimal client outcomes, especially when considering lifestyle interventions. Ouegnin and Valdes (2018) contributed that "evidence supports the use of HEPs as a cost-effective method for improving clinical outcomes such as pain, physical function, and quality of life" and that adherence is the "most significant factor in HEP's effectiveness" (p. 1). It is agreed upon that increasing cost-effectiveness is a priority for United States healthcare systems when offering services (Ouegnin & Valdes, 2018).

The current exercise brochures that are commonly used for home programming may be less effective than support and consultation from therapist, but additional direct support increases cost of programming, therefore facilitating a need for therapists to find ways to be both involved in a client's care while still being cost effective (Simek et al., 2012). Thus, clinicians are tasked with finding creative ways to reach more optimal patient outcomes, even though insurance implications mean that clients have less time for direct treatment (Ouegnin & Valdes, 2018). Home programs have the potential to effectively address treatment needs outside of the clinic, especially when insurance for direct treatment is limited. However, to be effective, home programs need to be well designed by practitioners. Clinicians should also involve the client in the decision-making process when formulating home programs (Ouegnin & Valdes, 2018). Occupational therapists, as well as other practitioners, should consider how to effectively address and increase adherence to at-home treatment through the client-centered creation and delivery of these programs. McLean et al., (2018) noted that interventions to increase adherence may be more crucial for patient outcomes than improving the exercise intervention components, as was also indicated by Haynes, Mcdonald, Garg, & Montague (2002). Affordable interventions to improve adherence may have significant effects on healthcare costs and treatment interventions (WHO, 2003). It seems that determinants of adherence have only begun to be explored in current literature.

To further the discussion, there are benefits of continuing therapy that may not be realized with low or non-adherence to HEPs (Picha & Howell, 2018). For example, short-term supervised exercise programs have been shown to improve health outcomes for people with chronic health conditions, however adherence rates of physical activity often

decline following the conclusion of these programs (Jansons et al., 2017). Increased ongoing participation of physical activity in populations with chronic conditions may be a practical and affordable solution to reduce healthcare costs, improve exercise tolerance, increase quality of life, and reduce other psychosocial illnesses (Jansons et al., 2017). In a randomized control trial, groups were given either gym-based program or a home-based program to follow treatment (Jansons et al., 2017). Jansons et al. (2017) found there was no significant difference between gym-based and home-based programs in the primary outcome for quality of life. Depression symptoms were lower in the gym-based intervention over the twelve-month period, perhaps, in part, due to social participation (Jansons et al. 2017). Between groups, long-term outcomes of exercise adherence were similar (Jansons et al., 2017). In another random control trial, post-stroke participants in an eight-week home program significantly improved in all quality of life measures and depressive symptomatology (Linder, Rosenfeldt, Bay, Sahu, Wolf, & Alberts, 2015),which highlights the positive psychological impacts that well designed home programs can have on individuals after an injury. Ability to promote maintenance of desirable healthy behaviors over long periods of time is also an important quality of a well-designed home program. Quality of life and reduction of pain may be promoted by exercise and physical activity, as is advocated for via long term management strategies by clinical guidelines (McLean et al., 2017). Understanding ideas for promoting ongoing follow up physical activity for populations with chronic conditions is important (Jansons et al., 2017). Without effective management strategies, populations, such as those with musculoskeletal disorders or recovering from stroke, are burdened by the progressive functional limitations, as well as associated work and financial consequences (McLean et

al., 2017), which may affect occupational performance and well-being. Maintenance of exercise behavior may be important to access long-term health benefits of physical activity (Jansons et al., 2017; Simek et al., 2012).

Barriers of Adherence to Home Programs

Adherence to home programs is a complex, multifactorial issue for clients and practitioners alike. Researchers have initiated exploration of various factors to adherence, including barriers and facilitators, however the focus tends to be on client-related factors (WHO, 2003). Limited evidence of sufficient quality exists on barriers and predictors of treatment adherence (Jack et al., 2010), and it seems the bulk of evidence available on adherence to home exercise programs has been produced by the physiotherapy profession (Jack et al., 2010; Peek et al., 2016), however there are a host of other allied health professions that have contributed mildly. Jack et al. (2010) alluded to the fact that much available research is focused on patient factors and dismisses barriers of health professionals and organizations in terms of influencing patient adherence (Simek et al., 2012; WHO, 2003). Consequently, significant clinical recommendations and guidelines are limited at this time. Broad categories of real and perceived barriers to adherence include client and lifestyle factors, intervention (home program design) factors, and provider factors, each category affected by technological, social and environmental contexts as conceptualized by the ecological model for adherence in rehabilitation (Radomski, 2011).

Barriers related to personal factors.

Argent, Daly, and Caulfield (2018) cited the client's perceived barriers, belief and self-efficacy of home programs, locus of control, pain, physical activity, psychological factors, and social support as barriers to adherence of home exercise programs. Additionally, DeForge et al. (2008) found that adherence to home exercise program recommendations was negatively influenced by increased medical complications and age of the client. Also, of negative influence on adherence were the patient's perceptions of the necessity of the recommendation as well as the need and availability of assistance from a family caregiver or a healthcare professional (DeForge et al., 2008). Certain populations, such as older adults, may be more vulnerable to non-adherence and that it is especially important to target home exercise program adherence due to limited support for engaging in physical activity following discharge (DeForge et al., 2008). There are also barriers affecting the education processes associated with home programming. Bastable and Gramet (2011) identified major obstacles affecting a person's ability to learn information from health care providers which included: stress and anxiety associated with acute and chronic illness, low literacy of written and verbal instructions, personal characteristics of readiness to learn (learning style, motivation), and developmental stage characteristics. Additionally, the number and complexity of behavioral changes needed, not wanting or denying learning needs, negative influence of the environment, and lack of needed support from caregivers or healthcare providers were identified as barriers of learning (Bastable & Gramet, 2011). These internal personal factors can influence the learner's ability to process information provided by OTPs and may impede the patient's ability to adhere to recommendations provided, which in turn

may decrease overall self-management and quality of life upon return to independent living (Bastable & Gramet, 2011). It is critical that OTPs take a variety of personal factors of an individual into consideration when providing recommendations to clients or patients to be successful in promoting adherence.

Self-efficacy.

Self-efficacy was a common factor in the literature found to be strongly related to adherence to home exercise programs (Essery, Kirby, Geraghty & Yardley et al., 2017; Jack et al., 2010; Lambert et al., 2017; Picha & Howell, 2018; Picha, Jochimsen, Heebner, Abt, Usher, Capilouto, & Uhl, 2018). In rehabilitative settings, low self-efficacy hinders a client's adherence (Picha et al., 2018).

> Self-efficacy has been strongly linked as a psychological factor affecting treatment adherence. It is a term used to describe an individual's belief in their own capability to achieve a task that will produce a targeted result. It is situation-specific and depends on activity, but it is considered that a person has a general level of self-efficacy across tasks. (Argent et al., 2018, para. 11)

Patterns of self-efficacy may change over time and are strongly influenced by "affective, behavioral, and social factors" (Picha & Howell, 2018, p. 234). According to Jack et al. (2010), low self-efficacy can be addressed with strategies that are specific to an individual's stage and skill set. Agreeing on realistic expectations and working together to achieve client-directed goals may promote increased self-efficacy (Jack et al., 2010). It may also be important to incorporate elements of setting goals, action planning, coping planning, and positive reinforcement when designing home programs to increase client self-efficacy and adherence (Jack et al., 2010). Picha and Howell (2018) offered

practitioners a guide with self-efficacy theory in order to promote a more personalized program to a client with any given level of self-efficacy. The authors articulated that theory is not well discussed within the body of evidence for adherence, though it should be (Picha & Howell, 2018). Practitioners have the opportunity to increase a patient's self-efficacy, but levels must first be recognized before an appropriate and individualized home program can be created to ultimately improve adherence and outcomes.

There is increased recognition that a client's beliefs, perceptions and attitudes about self, his or her condition, treatment, and efficacy of home programs may play a role in adherence (Ouegnin & Valdes, 2018). Low adherence is associated with a greater perceived number of barriers (Jack et al., 2010). In fact, the "patients' perceived barriers is one of the most widely documented barriers to adherence with examples such as forgetting to exercise, not having the time, or not fitting into the daily routine all being cited as reasons for nonadherence" (Argent et al., 2018, para. 17). Simek et al. (2012) authored a systematic review to investigate the evidence for the characteristics of a fall-prevention home exercise program affecting adherence in older adults. While balance training was associated with increased full and partial adherence to home exercise interventions, programs that included flexibility training appeared to decrease adherence levels (Simek et al., 2012). Simek et al. (2012) offered that participants may have adhered to the interventions they believed would be most effective in reducing their risk of falling, suggesting that the older adults in their study "subscribed" to balance training as an effective way to reduce falls, but not to flexibility training. According to the health belief model, expected benefits of a certain health behavior by a client are a key factor in influencing participation in the behavior (Simek et al., 2012). Additionally, Argent, Daly,

and Caulfield (2018) found that if a patient believes a condition to be less threatening, adherence to home programming may actually be lower and vice versa, however increasing a client's perception of a condition's threat is not a therapeutic option for a clinician. There was moderate evidence for how an increased health locus of control may positively impact adherence, while clients with an external locus of control seemingly demonstrated lower adherence (Argent & Caulfield, 2018).

Motivation.

Motivation is also an important factor of adherence to consider (Donoso Brown & Fichter, Jack et al., 2010). A study was conducted by Donoso Brown and Fichter (2017) of 73 OTPs' current prescription of home programs following stroke to understand strategies and techniques used for continuation of recovery, especially regarding technology use and adherence strategies. OTPs in the study identified motivation as the most common barrier affecting a client's adherence to home programs. While OTPs reported that incorporating interests and goals was a method used to make a home program more meaningful, they also reported commonly using rote exercises as home programs interventions. Rote exercises include repetitive movements that are often limited in meaningful purpose and abstractly separate from context and occupation (Zimmerer-Branum & Nelson, 1995). The most common types of interventions prescribed by OTPs for home programs were found to be range of motion and strengthening tasks, followed by weight bearing and then functional activities in a study by Donoso Brown and Fichter (2017). However, the therapists reported home programs were made meaningful to clients by incorporating goals, providing education and instruction, and including instrumental activities of daily living and activities of daily

living (Donoso Brown & Fichter, 2017). It has been indicated in research that choice is a basic client right that fosters increased levels of performance and long-term development of an internal feeling of self-efficacy and that occupationally-embedded exercises are the preferred choice over rote exercises (Zimmerer-Braunum & Nelson, 1995). In a study comparing occupationally embedded exercise (OEE) versus rote exercise in young adult females, the authors found that the OEE subjects significantly increased in the number of repetitions, the amount of time performing, conveyed lower amounts of stress, and greater perceived levels of happiness when completing the OEE tasks (Hoppe, Miller, & Rice, 2008). Being motivation has been identified as one of the most common and important factors to home program adherence, motivational interventions to promote function and facilitate engagement in meaningful activities should be more widely used and supported by OTPs (Donoso Brown & Fichter, 2017). However, the literature seems to suggest that OTPs do not fully utilize occupationally-embedded, task-oriented and functional exercises in practice to promote motivation for engaging in a home program.

Pain.

Pain was indicated as a considerable barrier to adherence in current literature (Argent et al., 2018; DeForge et al., 2008; Donoso Brown & Fichter, 2017; Jack et al., 2010; Lambert et al., 2017). Specifically, increased pain levels during exercise were associated with lower adherence levels (Jack et al., 2010). In a descriptive survey about home programs completed by 73 OTPs with stroke rehabilitation experience, pain and frustration of the client were among the top five barriers as perceived by OTPs (Donoso Brown & Fichter, 2017). In a prospective pre-post study for an app-based exercise program in adolescents with hyperkyphosis, personal adherence barriers included

unchanged or worsening pain, while supportive personal attributes included a belief that the exercises could "cause pain reduction and muscle strengthening" (Zapata, Wang-Price, Fletcher, & Johnston, 2018, para. 17). Participants in the study also suggested making exercises fun and including pain relief strategies to help them adhere to exercise (Zapata et al., 2018).

Physical activity.

Low physical activity levels at baseline have contributed negatively to adherence rates (Argent et al., 2018; Jack et al., 2010; Zapata et al., 2018;). "Emphasizing physical activity in the context of social participation, a factor found to promote exercise, may be more enjoyable than a formal exercise program" (Zapata et al., 2018, para. 23). High adherence improves efficacy of interventions aimed to promote healthy lifestyle behavior which includes physical activity (WHO, 2003, p. 34). Reciprocally, higher levels of physical activity at baseline has been thought to promote adherence to home programs. Physical activity, along with exercise, also plays an important role in promoting a higher quality of life (McLean et al., 2017).

Other client factors.

Other client psychosocial factors have been studied as potential barriers to adherence and include depression, anxiety, and helplessness (Argent et al., 2018; Jack et al., 2010). Additionally, low in-treatment adherence (Jack et al., 2010), cognitive impairments (Donoso Brown & Fichter, 2017), and musculoskeletal issues (McLean et al., 2017) are other personal barriers related to adherence. Higher adherence has been perceived by therapists to be associated with increased client insight, memory, attention, as well as being more proactive in the therapy process (Proffitt, 2016). Musculoskeletal

conditions may be worsened by factors such as sedentarism and obesity, along with other unhealthy lifestyle routines and habits (McLean et al., 2017). It stands to reason that these conditions can be improved by altering these routines and habits into healthier and more productive ones.

Furthermore, contextual barriers have also been explored in the literature. Collectively, researchers have cited transportation difficulties, childcare needs, family dependents, lack of social support, work schedules, lack of time and poor fit to routine, financial constraints, inconvenience and forgetting (lack of reminders) as significant barriers to following a home program effectively (Argent et al., 2018; Jack et al., 2010; DeForge et al., 2008). Adolescent participants reported that social participation would have helped them complete exercises (Zapata et al., 2018). DeForge et al. (2008) found barriers to adhering to recommendations for using durable medical equipment that included low patient perceived importance, and limited space in the physical environment. Additionally, adherence facilitators to discharge recommendations were increased with more community mobility availability, family support, and access to health care providers for support (DeForge et al., 2008). Lack of caregiver and social support from family may also be strong predictors of low adherence, as found in a systematic review (Jack et al., 2010), and perceived by OTPs (Donoso Brown & Fichter, 2017). Support and positive feedback may increase the therapist-client relationship and offer social and activity support for those who more readily exercise when socially stimulated (Jack et al., 2010; WHO, 2003). It was recommended that social exercise groups in community or participation and motivation from family members be considered to promote follow-through (Jack et al., 2010). Indeed, an individual's social

environment, including family, community, and other peers may play a key role in decreasing time needed in direct therapy treatment (WHO, 2003).

Connected health technology.

Connected health in one article was described as a "variety of technologies to inform and aid health care delivery in a data-driven manner with the individual at the center" and can include "digital, mobile, and telehealth" according to Argent, Daly and Caulfield (2018, para. 3). Certain technologies, such as telephone support, have been found to moderately increase adherence (Simek, 2012), whereas the effectiveness of other forms of technology to facilitate adherence are still being explored in the literature. The evidence surrounding the use of apps and other forms of smart technology in a rehabilitative context is limited which interestingly does not align with how available powerful technology is to clinicians today in terms of promoting adherence rates (Donoso Brown & Fichter, 2017; Emmerson et al., 2017). Even with mild research exploration however, it was evident that there is real potential of connected health technologies to incorporate a multitude of adherence-aiding interventions. Diverse technologies have and can be used to enhance client-centered care and adherence rates by reducing burdens for clinicians to supplement supervision when providing services that address clients' barriers to adherence (Argent et al., 2018).

Characteristics that make device apps with home programs an attractive choice include that they are inexpensive and have the capability to track a patient's progress from afar (remote tracking). They also have the potential to include valuable feedback and memory prompts to clients who need them (Zapata et al., 2018). There may be many characteristics of these technologies than can be channeled to address client and clinician

barriers and facilitate adherence to home programs (Argent et al., 2018). In a technologically growing global world, computer and mobile-based HEPs should be considered as supplemental or alternative to traditional paper handouts, especially in respect to allowing client preference and promoting adherence. Researchers found that people with musculoskeletal conditions that received a home program on an app with remote support reported better adherence and showed better improvements in function compared to those receiving a home program on paper without remote support (Lambert et al., 2017).

In a study investigating patients following stroke and their primary caregivers feelings towards mobile-based home programs, the researchers found that the acceptability to use a mobile-based home exercise program was 92% percent for caregivers and 90% for patients (Mahmood, Blaizy, Verma, Stephen Sequeira, Saha, Ramachandran… Solomon, 2019). Attitude towards the use of this technology was optimistic as well, with the majority of responses being positive in terms of accepted benefits that included: cost reduction, reminders for exercises, improved awareness about condition, ease in access to follow up with therapist, reduction of time for services, and confidentiality (Mahmood et al., 2019).

Furthermore, Zapata et al. (2018) explored how software applications might encourage adherence in a rehabilitative setting, as these settings have not yet taken advantage of apps for adolescents with musculoskeletal conditions, despite this population's familiarity and widespread use of them. Technology barriers of the participants were cited in the study as "technology device limitations, connectivity, and Internet access" (Zapata et al., 2018, para. 17). Participants also suggested that text

messages or pop-up notifications via the app might be useful reminders to engage in their home program (Zapata et al., 2018). Several studies did not indicate significance in the use of technology-based programs over standard paper-based HEPs, as was the case in a study done by Emmerson et al. (2017) for patients recovering from stroke. However, being that there were no differences between the groups in this randomized control trial (paper-based home programs were not significant), smart technology may be a responsible and feasible option when considering individual characteristics and those who prefer smart technology, as it is reasonable to tailor a HEP to a client's preference and to expand potential for adherence-aiding considerations (Emmerson et al., 2017).

Connected health technologies have the capability to accommodate a wide spectrum of client preferences. They can also incorporate video instruction with visual appeal and clear directions that are effective in relation to client adherence and outcomes. Ouegnin and Valdes (2018) sought to discover what instructional mode of home exercise program (HEP) delivery outpatient clients preferred between a paper-based program and one that included a mobile video and found that 69% indicated the video option as their preference, 17% preferred both, and 14% favored just the paper handout. Patients that chose the paper handout reported they did so because of how easy it was to access and how familiar it was to them (Ouegnin & Valdes, 2018). Additionally, the paper could serve as a visual cue to help patients remember to perform exercises. Meanwhile, its mobile counterpart seemed to allow for increased comprehension and confidence for clients performing the home program (Ouegnin, & Valdes, 2018). One of the themed answers to preference of video mode HEPs was that "it was easier to follow video than trying to interpret a hand drawn illustration" (Ouegnin

& Valdes, 2018, p. 4). Ninety-six percent of respondents in the study conducted by Ouegnin and Valdes (2018) stated the video mode allowed them to see how to perform the exercises correctly and 90% found it more visually appealing, while 86% of people that believed one tool would help them perform exercise more regularly believed it to be the video.

Currently, though there is a lack of clinical guidelines for utilizing technology in therapeutic and adherence-aiding avenues, there are technologies available that are being used by clinicians. An informal review of websites providing home exercise program tools for clinicians was conducted through an online search using the *Google* search engine. To date, there were several websites found that are available to therapy clinicians (i.e. physical therapists and OTPs) that include tools to create home exercise programs. Research about the use, effectiveness, and adherence to these online programs remains limited or non-existent. The free versions of these websites often lack adherence-aiding tools and the sites collectively have limited pre-inventoried task-oriented or occupation-based exercises available whereas there are hundreds and thousands of rote exercises embedded within sites to create "custom" home programs. Some of these programs allow a user to include personalized uploadable exercises and instructions, which would allow for inclusion of occupationally-embedded exercises, however this may add significant time devotion by clinicians tasked with doing this task themselves. One specific website with a home program tool was found to be well-designed to include adherence-aiding strategies, however the cost was considerable at $300 per clinician per year. There are cost associations with well-designed online tools that occupational therapy clinics and clinicians may be unwilling to pay without

more evidence and incorporation of adherence-strategies that align with the profession.

Barriers of practitioners and organizations.

Ultimately, the client is not to be "blamed" for the personal barriers associated with low adherence, rather it is the responsibility of healthcare professions and providers such as OTPs to support the client to address barriers (not just client-related barriers) in an evidence-based and therapeutic manner. Consequently, practitioner and organization factors must also be considered when addressing the current use of home programs (WHO, 2003). Unfortunately, there is a lack of professional clinical guidelines specifically for adherence related to home programming (Radomski, 2011), however connections can still be drawn to professional guidelines related to other treatment aspects that address a client's holistic needs, and adherence-aiding inferences can be made and trialed when combined with what evidence is available. Solving problems associated with adherence has more to do with how factors of systems, providers, and interventions can be improved to address the adherence needs of the client, though these aspects have been relatively neglected in research (Gustafsson, Molineux & Bennett, 2014; Radomski, Anheluk, Arulanantham, Finkelstein & Flinn, 2018; WHO, 2003).

Current use of home programs by occupational therapy practitioners.

Proffitt (2016) aimed to explore current usage of home programs in occupational therapy practice for clients with neurological injuries. Three hundred and sixty occupational therapists' responses were included in the survey (Proffitt, 2016). The researcher's findings showed that most (94%) of therapists prescribed home exercise programs to this population and the majority of the interventions included preparatory methods such as stretching, active range of motion, fine motor activities, as well as parts

or whole of activities of daily living tasks (Proffitt, 2016). The bulk of home programs being delivered do not correlate well with current evidence and often reflect the use of preparatory methods rather than occupation as an organizational factor in current home programs produced by occupational therapists (Donoso Brown & Fichter, 2017; Gustafsson et al., 2014; Proffitt, 2016; Radomski et al., 2018).

Contextual challenges to using occupation.

As previously discussed, OTPs face challenges with the execution of EBP approaches that are centralized around using occupation, the organizing concept and differentiating factor of the profession from other healthcare providers, rather than exercise, to promote optimal patient engagement and outcomes (Gustafsson, Molineux & Bennett, 2014; Radomski et al., 2018). In a practice analysis, Radomski et al. (2018) studied current practice of occupational therapists, specifically looking at home program prescription with inpatient post-stroke patients following discharge. Researchers found that of the 24 patients in the study, 20 received home programs that only included written and visual exercise instruction, whereas just one patient received a program designed in a narrative form that promoted a tasked-based training approach, which is an occupation focused approach and supported by current evidence in stroke rehabilitation (Nilsen, Gillen, Geller, Hreha, Osei, & Saleem, 2014; Radomski et al., 2018). According to Almhdawi et al. (2016), a task-oriented (TO) approach "is a highly individualized, client-centred, occupational therapy, functional-based intervention compatible with motor learning and motor control principles such as intensive motor training, variable practice and intermittent feedback" (p.445). Additionally, a context-based analysis was performed on the documents and the finding was that exercise-based recommendations

following discharge may have been the social norm of the two facilities in which home programs were made from pre-inventoried handouts and used due to time constraints and pressures that are ever-present in the clinical world (Radomski et al., 2018). Additionally, no leadership mandates for using current evidence-based treatment approaches were implemented in the settings (Radomski et al., 2018). The results of the Radomski (2018) study suggested that though OTPs are aware of evidence for home programming interventions, there are several contexts that may limit or prohibit the therapist from carrying out EBP effectively, including the important logistical context of time.

Therapists' experience of limited time, resources, and knowledge on how to find and translate evidence-based literature into practice (Proffitt, 2016; Radomski et al., 2018) may negatively impact adherence to home programs. Additionally, OTPs may lack organizational structures to allow the validation of knowledge and transfer to practice (Laverdure, 2019). Laverdure (2019) asserted that the "gap between what is known, how it is disseminated and absorbed, and what is done in practice affects service delivery outcomes" (p. 9). Occupational therapy clinical practice guidelines currently lack recommendations for OTPs to implement EBP into decision making regarding home program prescription (Proffitt, 2016). The current amount of clear home program description available limits the ability of OTPs to connect evidence from literature into home program design and implementation with clients and caregivers (Proffitt, 2016). Identification of effective pieces of a home program description will reduce the barriers to time and adherence of clients as well as help OTPs have a clearer rational to design and implement home programs when educating clients and caregivers (Proffitt,

2016).

Client-centered goal setting.

According to evidence, home program interventions should be guided towards client goals rather than merely building functional skills deemed important by clinicians, as this will help to ensure true client-centered care in the treatment planning of individuals (Proffitt, 2016). Utilizing client goals developed in evaluation by occupational therapy assessments and discussion, an OTP can help ensure that the client is an active part of the rehabilitation process and that occupations are targeted. For example, the Canadian Occupational Performance Measure (COPM) is a standardized occupational therapy evaluation used as an initial assessment and as an outcome measure for the clients perceived ability and satisfaction to perform in the areas of self-care, productivity, and leisure (Law, Baptiste, Carswell, McColl, Polatajko, & Pollock, 2005). In this occupation-based assessment, the client is prompted to identify the important occupational problems to be addressed in therapy (Law et al., 2005). The COPM was used in a study investigating the TO approach to intervention in individuals following a stroke (Almhdawi et al., 2016). The TO approach was used in the study to allow clients to practice functional activities with a focus on providing clients with opportunities to discover the most efficient and effective strategies to perform the occupations of self-care, work, and leisure occupations to allow for participation (Almhdawi et al., 2016). Significant increases were found in patients following a stroke in self-perceived performance in top rated functional tasks, and satisfaction levels in preferred occupations (Almhdawi et al., 2016). The amount of time and quality of use of affected upper extremity (UE) in daily life functional activities increased as well as significantly faster

performance in motor function tests and these functional improvements were sustained at six weeks post intervention (Almhdawi et al., 2016). Subjects of the study reported to appreciate the TO approach, and thought it was client centered which is an important factor in overall patient satisfaction and participation (Almhdawi et al., 2016). Nilsen et al. (2014) suggested that TO training should be the foundation for interventions to improve occupational performance in post-stroke population and may be combined with other cognitive strategies for better results in function of upper extremity and activity participation. Other common interventions were also shown to be effective in improving activity participation and upper extremity function and suggested by the authors to be combined with TO training for better outcomes and increased independence for self-practice in this population (Nilsen et al., 2014). Additionally, they found strong evidence for preparatory methods including strengthening and exercise targeting upper extremity function, balance and mobility, and activity participation to improve occupational performance if the client understands how it translates and works toward goals (Nilsen et al., 2014).

Home program dosage.

Exercise dosage refers to the frequency, duration, and time associated with recommended activities. Currently, there is a gap regarding dosage of activity and what therapists perceive to be necessary to produce improvement in client factors and functional outcomes based upon the concepts of motor learning and neuroplasticity (Proffitt, 2016). Moreover, there seems to be inconsistency between OTPs regarding amount and complexity of recommendations given to clients and caregivers, as well as the amount of time and repetitions clients should perform home program activities or

tasks outside of the clinical setting (Almhdawi, Mathiowtz, White, & DelMas, 2016; Jansons et al., 2017; Proffitt, 2016; Radomski et al., 2018). Common home program dosage ranged from 16 to 30 minutes per day, as therapists felt that dosage time over 30 minutes per day was taxing on clients and reduced adherence rates, as noted in a study of 360 OTPs conducted by Proffitt (2016). Linder et al. (2015) found that eight weeks for a home program prescribed to post-stroke patients was sufficient to significantly increase physical function, quality of life, and reduce depression symptoms in the participants. Adherence was measured remotely using patient reports, exercise logs, as well as accelerometers and were reported to be consistent with researchers' recommended program dosage of performing tasks and exercises five days a week for three hours a day (Linder et al., 2015). In another study investigating post-stroke home programming using the task-oriented approach, meaningful client centered tasks and activities were targeted and practiced most of the session (70%) at home or in the clinic, while the remaining 30% of the time was focused on other client interest needs including grasp-release, reducing spasticity, and strengthening (Almhdawi et al., 2016). Supervised practice was provided two times a week for 1.5 hours in clinic and participants were provided homework and instructed to do training 1.5 hours a day with the same percentages of time given to each type of intervention (Almhdawi et al., 2016). Therapists should grade or modify home programs based upon functional changes observed in clients and report of client or caregivers (Proffitt, 2016), so dosage and distribution of exercises by type may vary widely depending on the needs of the population and needs of the individuals, however, effective determinations and client feedback for dosage may play an important role in increasing adherence rates.

Patient education.

Home programs are often given to clients by providing paper copies of the exercises with written and pictorial instructions to educate clients and caregivers along with the opportunity to perform the exercise in front of therapists, instruction to practice the home program in front of the mirror, and return demonstration of the client following learning (Proffitt, 2016). Patient education is a crucial factor to consider when addressing patient adherence to home programs. Patient education is a process in which a health care provider conveys messages to the patient in order to promote independence through daily participation in healthy behaviors (Bastable & Gramet, 2011). It is important for OTPs to consider learning styles, readiness to learn and the learning needs of the individual before providing patient education (Bastable & Gramet, 2011). Determining whether the information given is understood by patients is important when considering that learner participation and effective education are interrelated (Bastable & Gramet, 2011). According to Bastable and Gramet (2011), common barriers to health professionals' ability to teach patients include: limited amount of time, lack of teaching skill competency, low skill and motivation, non-conducive teaching environments, low institutional priority for education, belief that it is not effective, absence of third-party reimbursement, and documentation difficulties for education (Bastable & Gramet, 2011). Overcoming these barriers is a current challenge among health care providers and creative strategies must be developed and implemented to address these problems. It is important for OTPs to understand the importance and benefits of patient education, how to assess the learner, and then how to provide the most beneficial teaching methods and instructional tools for the patient (Bastable & Gramet, 2011). Clinicians should take

advantage of a variety of technologies when considering methods and tools to enable patients to take an active role and promote independence for self-management at home to reduce overall readmission rates and reduce health care costs associated with non-adherence to health care recommendations (Bastable & Gramet, 2011).

Adherence tools.

Adding to the issues associated with the barriers faced by clients and clinicians pertaining to adherence rates in home programming is that the literature garners limited or no support for standard assessments, measurements, tools and theoretical models related to adherence in home programs (Argent et al., 2018; McLean et al., 2017). Research studies that have focused on evaluation of adherence are limited in quality per absence of standard measures to use as robust and reliable outcome assessments (Argent et al., 2018). Additionally, authors consistently highlighted that there was a high risk of bias in self-report recalls often used, which is posed as a questionable form of measurement for reliable research (Argent et al., 2018). As self-efficacy is so closely related to adherence, appropriate assessments are necessary to implement interventions for self-efficacy in home exercise programs, but yet another issue stems from findings that there is not a standard for these types of measures (Picha et al., 2018). "If there is no tool to measure patient self-efficacy with this task, clinicians cannot identify appropriate interventions to increase adherence when needed" (Picha et al., 2018, p.484). In a recent study to find and appraise strong measures of adherence to exercise in studies focused on populations with musculoskeletal conditions, McLean et al. (2017) further justified the need of guidance for assessment of adherence in clinical trials or practice settings because of its virtual non-existence in the literature. According

to McLean et al. (2017), “clear recommendations for assessment of exercise adherence in musculoskeletal populations cannot be made due to poor reporting, inadequate quality, and meagre conceptual underpinnings of reviewed measures” (p. 435), even though the number of approaches reported in the literature is high. Apparently, “none of the studies explored the relevance, acceptability, or appropriateness of the measures to the population targeted, or considered respondent burden” (McLean et al., 2017, p. 435). There was no evidence of patients acting as research partners when measures were developed, which should be addressed to promote client-centered assessments of adherence. There were distinguishable differences between patients and healthcare providers concerning how effective outcomes are understood and reported, suggesting that what makes up of adherence may differ in perception between clients and clinicians (McLean et al., 2017). McLean et al. (2017) suggested that “a new patient-derived measure with a clear conceptual underpinning that reflects the needs of key stakeholders is essential to ensure meaningful investigation of the challenges and burden of adhering to exercise” (p. 435). The authors were critical of many published measures of exercise adherence, but also considered that this may be a difficult concept to measure.

Recap of Problems Related to Adherence in Home Programs

The problems surrounding home program adherence in diverse populations are abundant because of the multifactorial and contextual nature associated with maintenance of behavior changes and successful incorporation into daily routines. Often, there are several barriers to the maintenance of behaviors recommended through home program at a time affecting an individual, whether related to the context of persons, providers, interventions or otherwise, that need to be addressed if therapy adherence and outcomes

are to be improved (WHO, 2003). Ultimately, there are barriers to adherence associated with current home exercise programs that are not being adequately addressed by researchers and practitioners (Donoso Brown & Fichter, 2017). Too often, the client is charged with fixing his or her own adherence issues, and is not adequately included in the whole duration of the therapeutic process, whether considering the construction and use of client-centered measures, assessments, or interventions connected to home programs (Donoso Brown & Fichter, 2017). Collaboration with a client for individualized, goal-oriented, and home programming that follows EBP is indicated and strongly supported in the literature by pertinent allied health professions, but seemingly poorly executed in clinical settings, perhaps because of contextual barriers that lie within such as time and other organizational factors (Radomski, 2018). This is true of OTPs regarding design and distribution of home programs, as there is a significant gap between what is recommended by EBP and what is delivered. Though there are existing strategies to promote adherence to home programs that some OTPs may be aware of, there is a gap in how OTPs support individuals' engagement in home programs. There are limited resources to guide practice and limited opportunity to use these resources (Proffitt et al., 2016). In fact, guidance for best practice on how to increase exercise adherence does not exist according to McLean (2018) and, therefore, development and evaluation of exercise adherence interventions is also important. Another substantial gap in literature is highlighted by the limited randomized controlled trials that exist in published literature to investigate adherence-promoting interventions of exercise (Peek et al., 2016). Identifying, improving, and utilizing practical client-centered, adherence-aiding interventions and assessments may be more important than improving the efficacy of the

exercise intervention itself. However, improving the frequency of use of task-oriented exercises and other occupational-based concepts in home programs, as supported by EBP, may positively influence many of the client factors and psychosocial barriers associated with adherence that were found in the literature. As aforementioned, appropriate assessments are necessary to implement interventions for self-efficacy (Picha et al., 2018), however occupation-based exercise in home programs may inherently increase self-efficacy, and thus adherence. Occupational therapists are in a distinctly unique and well-qualified place to address these problems related of adherence of home programs and to help other professions with this issue in pursuit of better medical and societal outcomes (Radomski, 2011).

Promoting Adherence to Home Programs

Strategies to advance effective creation and implementation of home programs with higher chances of adherence need to be supported by OTPs, as well as researchers and other clinicians, to improve client health outcomes and reduce healthcare costs. Occupational therapy practitioners should be able to venture beyond exercise and other traditional methods that have not been found to correspond to desirable rates of adherence to find creative ways to promote follow through in home programs using the power of occupation, client-centeredness, and an understanding of holistic client, provider, intervention and environmental factors. Practitioners should also demonstrate a willingness to incorporate new interventions and technologies in pursuit of increased adherence to home programs. Increasing adherence in a practical manner requires practitioners to evaluate and target many factors and contexts through efficient designs with easier and more available access to adherence-aiding resources, as to reduce

organizational barriers. Occupational therapy practitioners are well qualified to adopt strategies that are evidence-based into home programming, as well as promote research from the profession in terms of the scope of the practice's influence on adherence rates. The research and knowledge base lacks for adherence and home programming within the occupational therapy profession, even though its members heavily utilize HEPs. It seems that authors of literature from varied health professions continue to suggest that a combination of tailored interventions with comprehensive consideration of the client's specific needs is the challenge to improving adherence, as there is not a "one-size fits all solution" (WHO, 2003; Zapata et al., 2018).

Occupational therapists should be more well versed and better trained in methods and tools to assess and promote adherence (WHO, 2003). From assessment of patient readiness and risk of non-adherence, to effective education and adherence-aiding interventions, to responsible follow-up, the occupational therapy profession needs to be more empowered to enable adherence in home programs, despite any and all barriers. One way these issues can start to be addressed is with the creation of an adherence toolkit containing behavioral tools and recommendations adaptable to different individuals and settings to address the gap in resources available, as recommended by the WHO (2003). The toolkit should align with the profession's values and improve client adherence and outcomes while incorporating available evidence and clinical reasoning through creative designs for increased efficiency and effectiveness in practice.

Chapter II Literature Review consisted of an evaluation and synthesis of peer-reviewed literature pertinent to the topic area of the current use of home programs used by rehabilitation professionals, an overview of adherence problems to such home programs, and an exploration of specific factors that influence adherence to home programs. Chapter III Methodology will provide an overview of the processes used to create the product.

CHAPTER III

Methodology

Chapter III Methodology includes a description of the methods, which are the activity processes and decisions used in designing and developing the product that is overviewed in the next chapter. In this chapter, we explored and described the inspiration behind the project, the literature review conducted to inform the project, the theoretical background used to guide the development of the project, and the decisions and steps taken during the creation of the resulting product. For the purpose of this scholarly project, the methodology is described in detail throughout this chapter and also made theoretically evident in the product. Our goal in this scholarly project was to address the lack of information and resources available to support occupational therapists and other rehabilitation professionals in addressing the multifactorial issues of home program adherence with clients.

Inspiration

The original idea to address home program prescription originated from several notable personal experiences and was corroborated by key pieces of scholarly literature. Prior to engaging in this project, a bulk of anecdotal experiences suggested that while clinicians reported the utter importance of the client following through with therapy recommendations at home, they also reported that most clients were not able or willing to achieve this. The same practicing therapists were not able to report how to

effectively address this issue, and the attitudes of such therapists seemed to reflect that they felt there was nothing they could do about it...that the responsibility lay completely and solely on the client. The consistency of these anecdotes, along with fieldwork experiences that presented a similar problematic message, piqued our interest as we pondered what more could be done on the therapists' end to promote follow-through with therapy recommendations, which led to a review of the literature. Inclusion of occupation-based activities was our first inclination as to a potential solution and it was the research findings of Mary Radomksi et al. (2018) that produced the final spark to engage us in a full-scale scholarly project. Radomski et al. (2018) described the common contextual barriers to occupational therapy practitioners providing task-based and evidence-based home programming to clients, and specifically how logistical contexts such as temporal barriers negatively influence practice.

Literature Review

The purpose of the initial literature review was to examine literature regarding the current use and prescription of home programming in rehabilitation, evidence-based practice regarding home programs, adherence factors related to home programs, barriers and facilitators of adherence to home programs, current use of adherence tools used in rehabilitation, and best-practice principles for promoting adherence for home programs. Peer-reviewed literature was obtained and reviewed using textbooks, websites, and online databases. A variety of online databases were utilized in completion of the literature review and product including but not limited to: American Journal of Occupational Therapy, CINAHL, Cochrane Library, EBSCOhost, Google Scholar, MEDLINE, OT search, PsycINFO, PubMed and Sport Discus. Multidisciplinary textbooks, and health

organization websites such as the National Institutes of health, Substance Abuse and Mental Health Services Administration, World Health Organization, Agency for Healthcare Research and Quality, and Centers for Disease Control and Prevention were also accessed. The main search terms used throughout the research process included: *occupational therapy treatment adherence, home program adherence, home exercise program adherence, exercise adherence, recommendations,* and *compliance*.

Mary Radomski, a well-established author in the occupational therapy profession, wrote an article on adherence in rehabilitation titled *More than Good Intentions: Advancing Adherence to Therapy Recommendations* (Radomski, 2011). It was this article that further assisted us in organizing our thoughts and introduced a relevant model, the Ecological Model of Adherence in Rehabilitation, which was used initially to guide our project. With continued investigation of the literature, we were inspired to eventually remodel Radomski's approach specifically to match the project, which is described later in this chapter. With a guiding model, we focused on articles that featured a spectrum of barriers and facilitators of adherence to home programs and considered a wide variety of factors, contexts, settings and populations. Specifically, we focused on identifying adherence factors and barriers from the literature review to comprise our literature review, while anticipating that facilitators and potential solutions would be further investigated and featured in our product to address the researched barriers.

Fishbone diagram.

As part of the literature review process, each peer-reviewed article was critically reviewed and systematically categorized into levels of evidence and relevance to the purpose of the literature review. The articles were organized according to similarities of

topic areas. From the articles deemed credible, themes emerged. The three main categories that were identified collaboratively from the literature review by the authors of this project include: *client related factors, therapist related factors,* and *health care system factors to home program adherence,* though most research to date tends to focus on client factors (WHO, 2003). Additionally, *intervention factors* were identified as major factors, though controlled mainly by therapists and informed mainly by client factors (if designed appropriately). For each category, sub-categories were collaboratively identified from the literature. Therapist related factors included: *communication* (therapeutic alliance, collaboration, feedback), *competence* (time/routine, knowledge, awareness, confidence, EBP translation, attitude), *intervention* (complexity, motivation/meaningful, inclusion of context, dosage, patient education); client related factors including: *learning* (literacy, readiness to learn, motivation, cognition), *personal* (physical activity levels, social support, comorbidities, forgetting, time/routine), *psychosocial* (self-efficacy, pain/energy, stress/anxiety, locus of control, perceived barriers, readiness to change, perceptions of benefits); and healthcare system factors including: influence of environment, availability and feasibility of outcome measures, tools, time, cost and resources. These factors were eventually organized into a cause/effect fishbone diagram to clearly depict an abundance of factors affecting home program adherence. This diagram became an instrumental visual reference to inform our development of the product and is also a tool located within the product. We decided to apply a fishing theme to the process and the product for the motivational benefit of the authors and the target audience, as described completely in the product, located in Appendix A.

Following organization of barriers, we identified which barriers were potentially modifiable that warranted further investigation and investment into possible solutions. The literature found containing potential adherence-aiding interventions and facilitators that were not explicitly discussed in Chapter II Literature Review were sorted and set aside for eventual inclusion into the product. It turns out that neither barriers, facilitators, nor psychometrically strong measures of adherence were well established in the literature for home program adherence (Jack et al., 2010). These gaps in literature and practice, especially in the occupational therapy profession, played into our decision to create a product that would make relevant resources and tools more readily available to clinicians.

Decision to share.

The bulk of the literature on the topic of home program adherence reviewed for Chapter II Literature Review was produced by the physical therapy profession (Jack et al., 2010) while the occupational therapy and other allied health professions contributed mildly, though importantly in relation to our product decisions (Proffitt et al., 2016). This research distribution contributed to our decision to make the product available and applicable to more than just occupational therapy practitioners. It only felt just that this product should be shared with and made applicable to professions that we had borrowed our research from, while calling on our profession to increase research and guidelines in this area, especially in terms of the effects of recommending meaningful occupation-based activities on home program adherence. Additionally, we strived to incorporate key occupational therapy practices into our product, and many occupational therapy resources were used in its creation.

Guiding Models

The creation of our product and the interventions therein were guided by several models. Namely, the Ecological Model of Adherence in Rehabilitation, by Mary Radomski (Radomski, 2007; 2011), inspired us to create our own model following similar constructs, but specifically to guide and match the theme of our project. The resulting model, the *Ecological Model of Home Program Adherence* (see Figure 1), was refurbished and reorganized to include a fishing theme and additional relevant constructs. In this approach, the person and adherence are placed directly in the center. This model considers that adherence is a multifactorial issue for rehabilitation populations and is related to client, intervention, provider, and healthcare system factors within the context of social, technological, and environmental factors that can act as either barriers or facilitators to adherence (Radomski, 2011). In this model, the social context is intentionally placed closest to the person (represented by a fishing person) in the innermost circle, followed by technological contexts (represented by a boat), in which social contexts can exist, followed by the vast environmental contexts (represented by water) on which the social and technological factors may ride. This model effectively prioritizes autonomy, choice, and motivations of a client, along with other constructs of self-determination (Deci & Ryan, 2002), and the learning process as key aspects to affecting client, therapist, intervention, and healthcare system factors in promoting adherence to home programs (Radomski, 2011), and is cohesive with ideals of the occupational therapy profession. Adherence is a process that involves collaboration and mutual decision-making; therefore, this model considers that the healthcare system and

providers share in the responsibility of empowering clients to adopt agreed-upon behavioral recommendations.

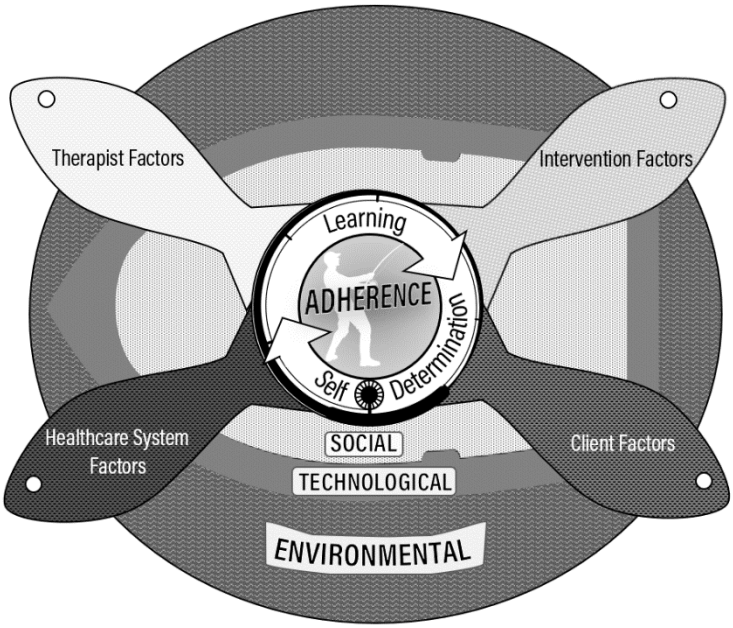

Figure 1. Ecological Model of Home Program Adherence.

Therefore, this model was used not only to organize multi-factors of adherence and identify ways in which to address them, but also as a constant reminder to consider a holistic set of factors and contexts when offering adherence interventions that offer choice and learning opportunities for the client and clinician, which this project reflects. There are several other models and theories guiding interventional components throughout the guide, with the authors' intent to supply usable integratable theories to facilitate a clinician's broad and multi-theoretical understanding of adherence. Theories woven throughout the product include the health belief model, self-efficacy theory, andragogy (adult learning), and others, including motivational theories. Theory was well-used throughout the creation of our product and is explicitly evident within the product itself. This was an intentional decision because of the lack of theory in the body

of evidence guiding home program adherence (Picha & Howell, 2018). The goal of balanced inclusion of theory inside the product is to give enough background and evidence for the clinician to understand why the intervention may work, without considerably adding to the time barrier problem.

Tackle Tips

Following the literature review, selection of a model, and reinvention of our own model, we created *TACKLE TIPS,* which became the central organizing document of our product to address the specific barriers and facilitate promotion of multiple adherence influencing factors found in the literature. *TACKLE TIPS* was inspired by a study that investigated the effects of therapist-focused knowledge translation intervention for improving patient adherence (Babatunde, MacDermid, & Maclntyre, 2017). The authors of this study found that a brief knowledge translation program improved therapists' knowledge and confidence in performing adherence promoting activities following the one-day workshop (Babatunde et al., 2017). Babatunde et al. (2017) suggested that a creation of an adherence enhancing toolkit would be beneficial for promoting adoption of consistent behavior in clinical practice through offering a simple stop for therapists to access evidence-based strategies and overcome associated time barriers. This format would allow therapists to use clinical judgement to implement practical strategies that best fits into his or her clinical setting (Babatunde et al., 2017). *TACKLE TIPS* was adapted from a document within this open access article that provided general interventions that aligned well with the research we had already conducted and the model we had adopted. We modified the tips into our own themed mnemonic in order to be inclusive of as much evidence and needs we had discovered in the research, while also

striving to keep all associated professions in sight with substantial weight of the occupational therapy profession.

We then collaboratively searched online databases, textbooks, and health organization websites listed above for evidence-based strategies and resources to address each broad strategy represented by *TACKLE TIPS* and organized them into the product. Additionally, our coursework from the University of North Dakota Occupational Therapy program was reviewed and used as appropriate in deciding on, and developing interventions for, the product. Finally, peer-reviewed literature previously set aside to inform our solutions was reexamined for applicability. Each broad *TACKLE TIPS* area has specific strategies listed within the product as well as a resource list that allows for therapists to have direct access to information and materials for addressing specific adherence needs and reducing time barriers that practitioners may experience. *TACKLE TIPS* is further described in the next chapter (Chapter IV). The original *TACKLE TIPS* created was refined many times in the process based on further exploration of evidence, creation and permission of tools, and other factors.

Tackle Tool Creation

During the process of developing our product, we identified current gaps relating to measures and resources available for implementing adherence promoting therapist behaviors in practice. For gaps that existed we created evidence-based tools and measures (*TACKLE TOOLS*) from literature that therapists can utilize in practice and promote adherence to home programming.

The first out of many tools developed for the product was the Online Home Exercise Program Evaluation Tool (OHPET), which is a systematic method to evaluate

and compare the adherence features of home exercise program (HEP) builders. Online HEP builders are web-based software that allow providers to create and customize HEP routines for their clients. This tool was designed as a guide to help clinicians more efficiently determine which online HEP builder and features will best meet the home program adherence needs of the client and clinician in their respective settings. In conjunction, a resource list of existing popular online home exercise programs on the web was developed. These tools were developed by exploring the adherence features of numerous sites, compared to those cited by literature and organized by the authors. Phone calls were made to sites if any clarifying information was required. Qualitative study procedures were performed to initiate the analysis process by coding the adherence-enhancing features of investigated sites. We used a cut and paste procedure from a paper copy of the potential adherence facilitators to organize the data by concepts. The codes were developed in accordance with key categories in the literature. Inclusion criteria for codes included adherence facilitators from the websites that matched with literature. Exclusion criteria for the codes excluded codes that had similar meanings to other codes or limited significance to adherence according to the results of our review of literature. The codes were discussed further by the authors and several were excluded from the coding process. The 33 remaining codes were grouped into four categories that were identified collaboratively by researchers. These included: *interface usability, customizability, adherence features*, and *support.* The codes were then grouped into appropriate categories and reviewed and revised for final production of the OHPET tool.

The self-efficacy tackle tool was developed by examining literature related to

self-efficacy and its role in adherence to home exercise programs. Specifically, the work of Kelsey Picha was important (Picha et al., 2018). In our literature review stage, we found that Picha determined that low self-efficacy had been identified as a barrier to adherence in rehabilitation (Picha et al., 2018). She also determined that reliable assessment of self-efficacy is useful and required to implement individualized interventions to improve self-efficacy, and thus rehabilitation adherence (Picha et al., 2018), however there were no such measures available. Picha and Howell (2018) contributed a model to improve rehabilitation adherence to home exercise programs for clients with varying levels of self-efficacy, and encouraged clinicians to assess and recognize barriers in order to adjust home program prescription and increase adherence (Picha & Howell, 2018). Picha (2018) determined that there was no specific tool to measure home exercise program self-efficacy and she went on to develop the Self-Efficacy for Home Exercise Program Scale (SEHEPS), which has been found to be a reliable scale with high internal consistency and good test-retest reliability (Picha, 2018). This scale may help to predict who may not be adherent to a home program and may help to inform clinicians on how to individualize interventions to increase adherence (Picha, 2018). This research was important and helped the authors to design the Self-Efficacy Tackle Tool, which features the SEHEPS for evaluation and recommendations for individualized interventions according to a client's level of self-efficacy. Contact was made with the author of the scale, Kelsey Picha, who permitted use of the SEHEPS in the product (Appendix B).

The Home Program Adherence Barrier Card Sort tool was developed due to the lack of barrier identification measures found in literature. This tool was inspired by other

card sort measures that we have utilized in past experiences. We thought it was important to give therapists the option of using this measure with clients who may have difficulties with a self-reporting barrier, and to facilitate adherence discussion between client and therapist. This tool helps clients and therapists identify current and potential barriers. The tool was developed from the barriers found in literature and consolidated into a user-friendly tool with recording sheets included.

The Home Program Adherence Scale was developed to address the lack of home program adherence measures. We were able to find adherence measures in relation to exercise; however, these were not inclusive of multidisciplinary treatment recommendations. This tool was adapted for home program adherence from a validated medication adherence scale developed by Ueno, Yamazaki, Yonekura, Park, Ishikawa, and Kiuchi, (2018). The reason this measure was chosen was due to the similarities of areas addressed by the scale and what we found in our research that was also in line with our chosen model for the product. We believe this measure will promote adherence through monitoring treatment adherence, and identifying client, therapist, and contextual factors that are influencing treatment adherence. We hope this measure will undergo further testing and development in future research studies to evaluate the effectiveness.

Additional tools developed to address psychosocial barriers are explained throughout the product. We intentionally placed an emphasis on addressing these barriers for several reasons. Perhaps most importantly is that there is strong evidence to suggest that several psychosocial factors are strong predictors of adherence, such as self-efficacy, motivation, and readiness to change, however these factors may go largely unaddressed in many rehabilitation settings. The reasons for choosing the models and

theories to guide our reasoning in this section was due to the high effectiveness of combining these approaches into the therapy process with standard practice (Miller & Rollnick, 2013; Stonerock & Blumenthal, 2017; Substance Abuse and Mental Health Services Administration, 2019). Most of the motivational and behavioral techniques have been highly used in substance abuse, and mental health settings, however recent research has found it effective for facilitating lifestyle behavioral changes and adherence (Miller & Rollnick, 2013; Prochaska, & DiClemente 1984; Stonerock & Blumenthal, 2017; Substance Abuse and Mental Health Services Administration, 2019). We chose these strategies due to the relatively easy translation into practice, knowing that once the skills are obtained by the therapist, they can be cost effective as well as time-efficient strategies for increasing client-centered care and adherence to home programs.

In addition to the tools described above, there were several other tools developed to address needs with slightly varied methodologies. In general, they were guided by the process and theoretical frameworks described in this chapter to meet the identified needs found in the literature review.

In summary, this project stemmed from our interest in promoting client-centered, evidence-based practice in the field of occupational therapy, and promotion of effective and feasible practice to improve therapists' and clients' function and participation in meaningful home programs and occupations. We chose to address the issues of adherence to home programs due to the standard usage by rehabilitation professionals, yet the low adherence rates to such programs by clients as cited in literature, and the perceivable lack of therapist and professional investment into this topic. In our methodology, we performed an extensive literature review, developed themes from the research, organized

factors of adherence into a fishbone diagram, developed the Ecological Model of Home Program Adherence, created TACKLE TIPS, researched evidence-based strategies for each tip, and developed tools/provided resources to address gaps in research. This all contributed to the creation of a product aimed at holistically addressing the complex issues of adherence that is in line with the core beliefs of the occupational therapy profession.

Chapter III Methodology consisted of a description of the theories used to guide creation of the product and an explanation of the process that occurred in creation of the product, the *Home Program Adherence Tackle Box.* The next chapter, Chapter IV, consists of an introduction and brief overview of the product, which is located in appendix A.

CHAPTER IV

Product

Overview

Chapter IV Product offers a concise overview of the product created in this scholarly project, located in appendix A. The final product, the *Home Program Adherence Tackle Box*, is a spirited, fishing-themed guidebook and toolkit designed to empower rehabilitation clinicians to therapeutically tackle the complex, multifactorial issues related to client follow-through of home program recommendations. The purpose of the *Home Program Adherence Tackle Box* is to guide, educate, motivate and equip healthcare providers in the rehabilitation setting to assess and address modifiable barriers to home program adherence more holistically, practically, and effectively, with the hopes that knowledge and evidence will be enjoyably translated into practice and home program adherence rates will rise. After all, higher rates of adherence lead to better client, clinician, and healthcare outcomes.

Guiding Models

The *Home Program Adherence Tackle Box* is guided by the Ecological Model of Home Program Adherence, as described in detail in Chapter III Methodology. To reiterate, this model was adopted and adapted to match the fishing theme and relevant constructs of the product. This model considers that adherence is a multifactorial issue for rehabilitation populations and is related to client, intervention, provider, and healthcare

system factors within the context of social, technological, and environmental factors that can act as either barriers or facilitators to adherence (Radomski, 2007; 2011). A visual representation and brief explanation of the Ecological Model of Adherence for Home Programs is placed within the beginning of the product so the users of the *Home Program Adherence Tackle Box* also have a guiding model in which to view the rest of its contents.

There are several other models and theories guiding interventional components throughout the guide, with our intent to supply usable integratable theories to facilitate a clinician's broad and multi-theoretical understanding of adherence. Theories woven throughout the product include the Health Belief Model, Self-Efficacy Theory, Andragogy (adult learning), and other motivational theories.

Product Contents and Organization

The product, *Home Program Adherence Tackle Box,* contains client-centered strategies and critical guiding resources that occupational therapy practitioners (OTPs), and other clinical rehabilitation enthusiasts, can use to skillfully facilitate client adherence to home program recommendations to enhance a client's function and occupations in life. It includes the development, collection, and organization of a multitude of relevant "tackle tools." This tackle box is meant to be expanded upon and updated as appropriate, as evidence for this topic improves, especially within the occupational therapy profession. In addition, it allows clinicians to incorporate their own research.

The product is organized by a dual-purpose table of contents, *TACKLE TIPS*, which is a mnemonic tool in and of itself used to categorize 10 general intervention areas to promote adherence. *TACKLE TIPS* was developed and modified to synthesize what

has been suggested in peer-reviewed research, and/or to address gaps in research. The broad *TACKLE TIPS* are meant to be reviewed first, before investigating in a more specific and applied manner. Each letter of *TACKLE TIPS* represents a section and broad intervention strategical category, with several specific strategies connected to and listed under each broad category. Each strategy tip can be easily accessed by page number to further reference relevant treatment information such as evidence, resources, and tools. Each section is complete with its own resource and reference page(s). Also included in the product are easy-to-understand and appealing visuals, such as the fishbone diagram depicting factors (barriers and facilitators) related to adherence, as found in the literature review. It is expected that clinicians will use clinical reasoning to evaluate which strategies will work most effectively and feasibly for their respective clients and settings. Important to note is that an appropriate combination of tailored strategies will be most effective.

The *Home Program Adherence Tackle Box* can be printed out and used as a hard copy material or downloaded as an interactive.pdf online. The guidebook contains tools throughout, however there are an additional 14 tools located in the product's appendix that can be printed and used at will. Tools, such as scales and evaluative measures, are also conveniently listed in a *TACKLE TOOL* list within the guidebook, so clinicians can easily refer to and use a specific tool. Most of the tools have been created or adapted by the authors of this scholarly project, while others have been used with permission, to address gaps in a clinician's available tools. Regarding application to the musculoskeletal rehabilitation setting, there is a considerable concentration of practical adherence interventions to address psychosocial factors and behavioral change.

Chapter III Methodology provided a brief overview of the product, which can be viewed in its entirety in appendix A. The fifth and final chapter, Summary, contains a summary of the project, limitations and strengths of the product, conclusions, limitations, and recommendations for implementation and future action, development, and research.

CHAPTER V

Summary

Chapter V Summary is a conclusion of our project that consists of a project overview for the creation of the *Home Program Adherence Tackle Box*, proposals for product implementation, strengths and contributions to practice, limitations of the product, as well as recommendations for future development and action.

Project Overview

According to the findings in the literature review, barriers to adherence related to current home exercise programs are not being adequately addressed by researchers and practitioners (Donoso Brown & Fichter, 2017). This is in part, because there is limited time, resources, and established measures available for rehabilitation clinicians to address the multitude of issues related to home program adherence, which can result in a therapist expecting clients to address these issues on their own, rather than collaborating with clients and empowering them to adopt recommended behaviors (Radomski, 2018). These issues exist in diverse populations and are abundant because of the multifactorial and contextual nature associated with maintaining behavioral changes and incorporating those changes into daily routines. It becomes important to consider person, provider, intervention, and healthcare factors to improve therapy adherence outcomes (WHO, 2003). Ultimately, there is a significant gap between what is recommended for evidence-based practice and what is delivered. However, guidance for best practice on how to

increase exercise adherence is essentially non-existent and therefore, development and evaluation of adherence-promoting interventions is key (McLean et al., 2017). These types of interventions may be more important than improving the efficacy of the home program interventions (McLean, 2018).

Therefore, the product, *Home Program Adherence Tackle Box*, was developed to meet the vast needs uncovered in the literature in as comprehensive and practical a way as possible. The purpose of this scholarly project was to develop a user-friendly guide and toolkit for rehabilitation practitioners to therapeutically "tackle" the complex and multifactorial challenges and barriers associated with a client's adherence to home programs, many of which are potentially modifiable. The holistic, therapist and client-centered product is informed by theoretical evidence such as Self-Determination Theory, Self-Efficacy theory, andragogy, and Health-Belief model, and guided by the Ecological Model of Home Program Adherence. These theories were intentionally included to be easily integrated with one another to support a multi-theoretical approach to improving adherence. The product is a themed guidebook that can be used as a hard copy or interactive .pdf complete with easy-to-reference strategies and tools developed, collected, and organized to address a client's adherence to home programs in order to enhance that person's function and occupational engagement in life. Many of the included adherence strategies and tools are combinable with one another and adaptable to the client in order to tailor treatment with respect to a thorough, and perhaps more systematic, consideration of a client's specific needs, which is also recommended by researchers across the board (WHO, 2003; Zapata et al., 2018).

Strengths and contribution to practice.

There are several clinical practice strengths of the *Home Program Adherence Tackle Box*, a product that contributes uniquely to the rehabilitation world. The distinctive product was informed by an extensive literature review and evidence that was inclusive of a variety of client and provider populations and has been designed in such a way that that can be used by such populations in a variety of settings. Authors from several different professions contributed to this project including, but not limited to, occupational therapy, physical therapy, speech language pathology, and psychology. There was collaboration with physical therapists during this project, including correspondence with the creator of the Self-Efficacy Home Exercise Program Scale. Additionally, there was correspondence with members of the Agency for Healthcare Research and Quality (AHRQ) and spokespersons for online home program builder websites.

The *Home Program Adherence Tackle Box* is the first electronic or hard copy guide of its kind made available to rehabilitation practitioners to practically and holistically address complex adherence issues that many clients experience. The strategically organized interactive .pdf can be used to reduce time constraints felt by rehabilitation professionals through direct access to a multitude of evidence-based information, resources, and created tools. The product is cleverly organized by a table of contents that also doubles as a tool (*TACKLE TIPS*) containing all the general adherence recommendations and strategies that the authors found pertinent from research and experience. The theoretically driven tackle tools and resources contained within the *Home Program Adherence Tackle Box* can be used to facilitate treatment and home

program adherence, increase treatment effectiveness, and improve client and healthcare outcomes in a cost-effective and time-efficient manner. This product contains some relevant professional jargon, though it should be understandable to the target audience, as most words in question are defined clearly within the product. This product also promotes feasible translation of evidence into practice within occupational therapy and other rehabilitation professions.

In addition to clearly addressing needs in a practical manner, the product was thoughtfully and artistically designed, with consistent and intentional fonts, layout, style, color scheme, etc. However, no two pages are alike for the interest and benefit of the reader. There are subtle elements that the reader may not notice initially, but may have fun discovering, such as the style of the bullet points (fisheye). With the inclusion of a fishing theme for the benefit of the creators and the users, it was the intent of the authors that this product be not only user-friendly, but cohesive, compelling, motivating, and enjoyable to use. The product contains tasteful and relevant fishing pictures and graphics, quotes, facts, tips, and analogies to give it a personal, unique, and occupation-based touch. Important to note, perhaps, is that there is no need for a user to have any understanding of fishing to use the tools appropriately and effectively.

Implementation proposals.

The authors propose implementation of the *Home Program Adherence Tackle Box* into a wide variety of rehabilitation settings by an array of providers to determine its effectiveness and usability. Formal and informal outcome measures can and should be used to determine this product's effectiveness. A facility and/or clinician may decide to measure adherence before and after implementation of this product, and may do so using

the measures available in this product, however clinicians should be aware that even the act of measuring adherence has been shown to increase it. Additionally, observation of quantity and quality of engagement in home programs and connected outcomes is something clinicians should already be doing. A clinician may formally follow the changes in adherence from client to client, but if a system supports tracking and measuring outcomes for adherence alongside other outcome measures, the resulting data may have more power to change a culture in a shorter amount of time. We would like to continue to refine the product based on feedback from personal use, clients, and other clinicians. There are emails on the front and back of the product where users can send feedback. We would also like to continue to improve and update the resources and interactive links contained within the product. Finally, it may be beneficial to continue to update the product in accordance with technological advances and improved adherence research.

We recommend using multiple strategies within the tackle box to promote adherence in an individualized and tailored manner. Combining clinical reasoning with the tools of the product to consider a multitude of factors, as laid out in the Ecological Model for Home Program Adherence and the Adherence Factors Fishbone Diagram, specific to the client and setting is also recommended for optimal results.

Limitations.

There are several limitations in the creation and usability of this product. Though this product was meant to lessen the time burden of a clinician, we recognize that changing the current culture devoid of addressing adherence and giving appropriate attention to a client's adherence may still be challenging. A therapist may perceive that

by using this product, more time and effort is required, at least initially, than if the therapist were to gloss over this issue, as is the current propensity, and problem, for practice. It is perceivable that using the product will be viewed as "more time commitment" to a therapist who may feel overwhelmed about adding *addressing adherence to home programs,* in any capacity, to treatment planning. What may be important to realize is that our solution was the synthesized product of hundreds of hours of research and design to make it as comprehensive, yet as simple as possible, in order to honor the significant complexity and impact of the issue while still balancing it with accessibility and usability by providers.

Furthermore, it may be important to note that, depending on the individual client, it may not be necessary to implement additional adherence interventions, or it may only require a few simple strategies with minimal associated time requirements. Still, other clients may require and benefit from more time and labor-intensive interventions to increase adherence. It simply may be crucial for clinicians to spend time establishing a person's readiness to engage in a behavioral change or at-home program.

It may also become important for the clinicians to initially invest time into understanding what tools are available at his or her disposal to meet the specific and varying needs of the clientele. This can be done by reviewing the product and the associated resources and references, as well as performing any relevant and credible personal research. There are many strategies in the product that will relate to more than promoting home program adherence, such as improving a provider's therapeutic communication and client's experience overall. To change a culture and a therapist's routine, therapists must be made aware and educated about the serious implications of

this issue. The healthcare system factors must be more favorable to foster provider, intervention, and client factors and allow them to flourish. Therapists and clients must be well empowered to address adherence issues, which is what this product hopefully achieves to an effective degree. If healthcare systems and therapists realize the return from investing time into client adherence, *and the idea that it may actually save money and time in the long-term*, they may be more likely to regularly incorporate adherence measures and interventions supplied in our product into practice.

Finally, there is limited research on home program adherence, specifically by the occupational therapy profession, which means there are limited professional guidelines and occupation-based intervention resources specifically for home program prescription. Amongst all professions, there are gaps and limitations in validated measures and tools, clinical guidelines, and research on technologies in regard to improving adherence.

Recommendations.

There is potential for further development for both this product and topic in research and development. In addition to providing this scholarly project and the product herein to the public commons, it may be necessary to raise awareness about this topic in other creative ways to effectively change the current attitudes of professions, systems and practitioners about the importance of addressing adherence barriers. This could include such strategies as professional poster presentations, podcasts to break down the contents of the product and adherence issues, design of continuing education materials and courses, and professional publications on the topic. Additionally, the *Home Program Adherence Tackle Box* could reach a wider audience if linked on heavily visited and reputable websites. In addition, the creation of a dedicated website for this product could

support its expanse. These suggestions may present opportunities for further educational and implementation actions. Another idea for consideration is to collaborate and connect with key stakeholders and members of the profession to ensure that this product/topic reaches optimal potential and positively impacts many settings, clinicians, and clients.

Additionally, continued research on the unique role of client-centered, occupation-based intervention in facilitating client adherence to home programs may not only be beneficial for the outcomes of clients, but for occupational therapy profession. In the product, the authors propose that occupational therapy practitioners and occupation-based interventions are distinctly qualified and situated to powerfully and holistically address the issues related to home program adherence, though research needs to better support this assertion and implementation of adherence-aiding practice and guidelines. In addition, the profession could become more involved in creating online home exercise program builders that include readily accessible banks of occupation-based, purposeful, and task-based activities, to promote translation of evidence-based practice. Nearly all the home program builders available online are produced by members of the physical therapy profession, programs that are used heavily by the occupational therapy profession. It is recommended that development of an occupation-based activity bank is initiated and continually developed from a source that can have a wide reach to members of the occupational therapy profession.

This product could be further developed to offer interventions and strategies with more specificity to a variety of practice settings or conditions, such as neurological settings, as its applicability is quite broad in its current state. Additionally, technology's role in adherence should be further investigated in research and clinics, considering its

powerful potential and widespread common use in today's society.

There are several adherence tools and measures developed for the product that would potentially benefit from further testing, research, and modification. Developed adherence tools and measures could be researched and psychometrically tested to promote more standardized measurements for adherence. Tools that are currently more aligned with the scope of other professions could be adapted/matched to the occupational therapy profession and studied to ensure reliability and validity.

Conclusion

This product is a well-informed and well-designed solution that uniquely addresses many of the barriers of adherence to home programs found in peer-reviewed literature. Implementing the product appropriately and enthusiastically has powerful potential to sensitively serve the adherence-promoting needs of clinicians and clients in rehabilitation settings. We hope this progressive project will promote further work and research on this topic both within and outside of the occupational therapy profession. In time, we hope assessing and addressing adherence in a wide array of applicable settings becomes a standard of care, instead of the exception. Clinical guidelines, gold standard measurements, available resources, and purposeful products such as the *Home Program Adherence Tackle Box* have great potential to be made more readily available and result in more favorable outcomes for clients, providers, and healthcare systems, all by therapeutically promoting adherence.

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Appendix A

(Product: *The Home Program Adherence Tackle Box*)

Appendix B

(Permissions)

Request for Permission to use/adapt SEHEPS [Email transcript]

Hello Kelsey,
I am Nich Riveland, an occupational therapy student in my final semester of schooling at the University of North Dakota. My scholarly project partner and I are working on the creation of a toolkit for occupational therapists, and other rehabilitation clinicians, to promote *adherence to* home exercise programs, and we have strongly appreciated all of your hard scholarly work in this area, of which we have referenced in our literature review. It is our perception that you have produced a compelling and pertinent body of work in a needed area. Thank you!

I am writing to request permission to include/adapt the self-efficacy scale you recently published, the Self-Efficacy for Home Exercise Programs Scale (SEHEPS), in our toolkit for our scholarly project. Any modifications would likely be slight language adaptations to ensure fit with the scope of occupational therapy practitioners.

This would be greatly appreciated and, of course, you would be properly cited. I look forward to hearing from you.

Thank you for your important work and consideration,
Nich Riveland, MOTS

Hi Nich,

Thank you for reaching out. The scale is meant to be used by clinicians, so am happy to hear of your interest. May I ask how you plan to go about modifying it? Will you reassess or establish the psychometric properties then as well?

Thank you,
Kelsey

Hello Kelsey,
I hope you are doing well in these challenging times.
Self-efficacy for HEP adherence is as important as ever!

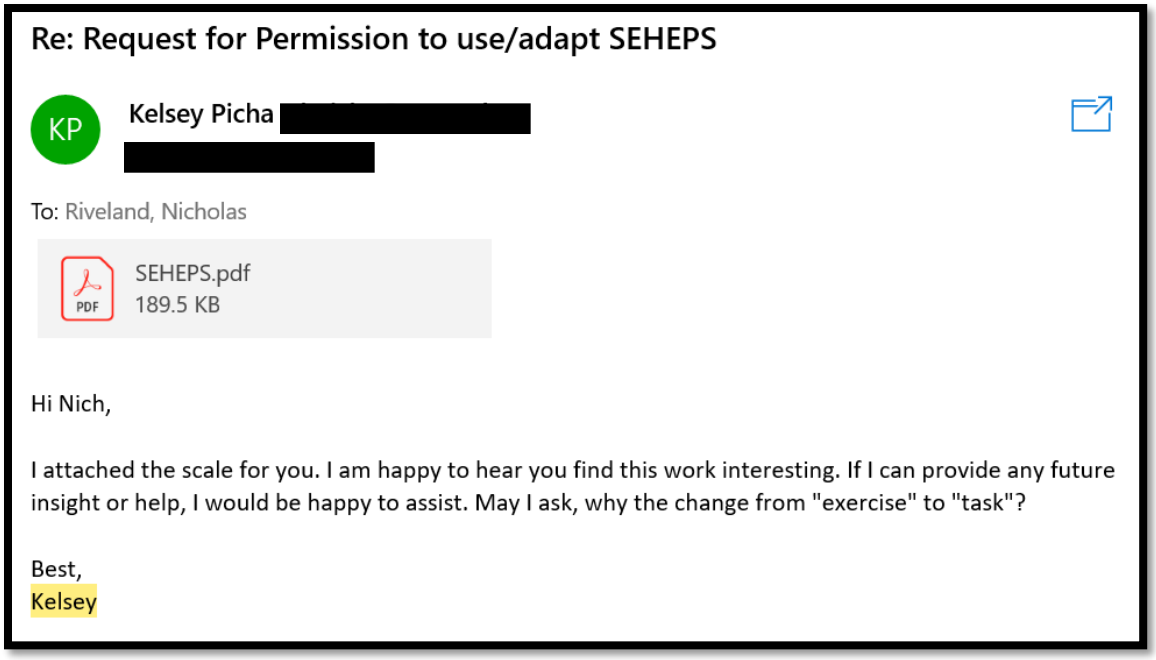
Thank you, kindly, for your response. To answer your question, we would not be reassessing the psychometric properties of an adapted version for our project, though we would promote future students to do so. Essentially, there would be virtually no changes for items...we would be simply be adding or substituting the word tasks for exercise, still in reference to home programming. I would like to first and foremost include your psychometrically sound scale, the SEHEPS, in the toolkit. Is the scale available as a separate document somewhere? I have only found it embedded in your article, thus far.

I have really appreciated digesting your research on the topic. I would also like to request to make a tool based on your model and intervention recommendations, along with other recommendations I have found in the literature. The tool would be a one-page guideline with strategies on how to evaluate, determine, and implement interventions for self-efficacy to promote HEP adherence.

Thank you, Nich

See next page.

Request for Permission to use/adapt SEHEPS [Email transcript continueed]



Re: Request for Permission to use/adapt SEHEPS

KP Kelsey Picha [redacted]

To: Riveland, Nicholas

SEHEPS.pdf
189.5 KB

Hi Nich,

I attached the scale for you. I am happy to hear you find this work interesting. If I can provide any future insight or help, I would be happy to assist. May I ask, why the change from "exercise" to "task"?

Best,
Kelsey

Dear Mr. Pettit:

I am responding on behalf of Ms. Randie Siegel, Deputy Director, Office of Communications at the Agency for Healthcare Research and Quality (AHRQ). I handle the majority of permission requests for the Agency.

I see no problem with your requests, either to link to pages within the AHRQ *Health Literacy Universal Precautions Toolkit* (2nd edition) and to the SHARE Approach poster. Therefore, this email is permission for you to link directly to topics and tools within the *Health Literacy Universal Precautions Toolkit* (https://www.ahrq.gov/health-literacy/quality-resources/tools/literacy-toolkit/index.html) and to the SHARE Approach At-a-Glance poster (https://www.ahrq.gov/sites/default/files/publications/files/shareposter.pdf) for your graduate project at the University of North Dakota (Grand Forks, ND). These can be printed out for individual use, but reprinting multiple copies would require separate permission. You can reprint the linked-to materials in your graduate thesis or capstone paper, noting that they are reprinted with permission of the Agency for Healthcare Research and Quality.

Please note that some of the tools linked to by the toolkit are previously copyrighted by the person or organization that first published them. You would need to obtain the rights holder's permission to reprint them in your thesis or capstone paper. Additionally, reprinting materials that you have linked to in a professional journal article or book chapter would require separate permission for the publisher from the AHRQ Office of Communications or other rights holder.

The suggested reference citations for the two source documents are

> Health Literacy Universal Precautions Toolkit (2nd edition). Agency for Healthcare Research and Quality, Rockville, MD. February 2015. https://www.ahrq.gov/health-literacy/quality-resources/tools/literacy-toolkit/index.html.

and

> "SHARE Approach At-A-Glance" poster (AHRQ Publication No. 14-0026-2-EF). SHARE Approach for Shared Decisionmaking. [SHARE Curriculum Tools]. July 2014. https://www.ahrq.gov/health-literacy/curriculum-tools/shareddecisionmaking/tools/index.html

Please contact me if you have any questions about this permission, or if your graduate program requires a signed permission letter on AHRQ letterhead.

Sincerely,

David I. Lewin, M.Phil.
Health Communications Specialist/Manager of Copyrights & Permissions
Office of Communications
Agency for Healthcare Research and Quality

Photo Personal Release Agreement

Grant

For consideration which I acknowledge, I irrevocably grant *Nich Riveland, MOTS and Colter Pettit, MOTS,* authors of the *Home Program Adherence Tackle Box* the right to the images of Everett Wurtz for the purposes of their scholarly project.
I waive the right to inspect or approve versions of my image used for publication or the written copy that may be used in connection with the images.

Release

I release the students, advisor and their scholarly project *Home Program Adherence Tackle box* from any claims that may arise regarding the use of my image including any claims of defamation, invasion of privacy, or infringement of moral rights, rights of publicity or copyright.

Company is permitted, although not obligated, to include my name as a credit in connection with the image.

Company is not obligated to utilize any of the rights granted in this Agreement.

I have read and understood this agreement and I am over the age of 18. This Agreement expresses the complete understanding of the parties.

Name: Everett Wurtz Date: 4/15/2020

Signature: 

Witness Signature: 

Photo Personal Release Agreement

Grant

For consideration which I acknowledge, I irrevocably grant *Nich Riveland, MOTS and Colter Pettit, MOTS,* authors of the *Home Program Adherence Tackle Box* the right to the images of Brandon Schmitz for the purposes of their scholarly project.
I waive the right to inspect or approve versions of my image used for publication or the written copy that may be used in connection with the images.

Release

I release the students, advisor and their scholarly project *Home Program Adherence Tackle box* from any claims that may arise regarding the use of my image including any claims of defamation, invasion of privacy, or infringement of moral rights, rights of publicity or copyright.

Company is permitted, although not obligated, to include my name as a credit in connection with the image.

Company is not obligated to utilize any of the rights granted in this Agreement.

I have read and understood this agreement and I am over the age of 18. This Agreement expresses the complete understanding of the parties.

Name: Brandon Schmitz Date: 4/15/2020

Signature: 

Witness Signature: 

Photo Personal Release Agreement

Grant

For consideration which I acknowledge, I irrevocably grant *Nich Riveland, MOTS and Colter Pettit, MOTS,* authors of the *Home Program Adherence Tackle Box* the right to the images of Bridger Pettit for the purposes of their scholarly project.
I waive the right to inspect or approve versions of my image used for publication or the written copy that may be used in connection with the images.

Release

I release the students, advisor and their scholarly project *Home Program Adherence Tackle box* from any claims that may arise regarding the use of my image including any claims of defamation, invasion of privacy, or infringement of moral rights, rights of publicity or copyright.

Company is permitted, although not obligated, to include my name as a credit in connection with the image.

Company is not obligated to utilize any of the rights granted in this Agreement.

I have read and understood this agreement and I am over the age of 18. This Agreement expresses the complete understanding of the parties.

Name: Bridger Pettit Date: 4/15/2020

Signature: Bridger Pettit

Witness Signature: JC Pettit