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Addressing Adherence to Home Exercise Programs in a Hand Therapy Setting

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Addressing Adherence to Home Exercise Programs in a Hand Therapy Setting

by

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A Scholarly Project

Submitted to the Occupational Therapy Department

of the

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In partial fulfillment of the requirements

for the degree of

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This scholarly project submitted by Austin Ellis in partial fulfillment of the requirement for the Degree of Occupational Therapy Doctorate from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

Andrea Young, OTD, OTR/L

Faculty Advisor

4/14/2023

Date

PERMISSION

Title: Addressing Adherence to Home Exercise Programs in a Hand Therapy Setting

Department: Occupational Therapy

Degree: Occupational Therapy Doctorate

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Austin Ellis

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Date

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ABSTRACT

Title: Addressing Adherence to Home Exercise Programs in a Hand Therapy Setting.

Background: Roughly 1,100 per 100,000 persons experience an upper-extremity injury per year including burns, fractures, or amputations (Ootes et al., 2012). These upper-extremity injuries can impact a person's physical function, activities of daily living (ADL), social, psychological, and financial aspects in life (Che Daud et al., 2016b). These statistics warrant the need for occupational therapy practitioners specializing in hand therapy, and other hand therapists to address these areas of client's lives that have been affected by their upper extremity injury.

Purpose: The purpose of this scholarly project was to increase the rates of adherence to home exercise programs in order to improve the effectiveness of rehabilitation. The intended audience for this product was the clients receiving the home exercise programs and for therapists working in a hand therapy setting.

Methodology: The product was developed following a review of literature that showed the need to increase adherence to home exercise programs. The literature showed that the rates of non-adherence to home exercise programs can be as high as 50-65 percent (Wright et al., 2014). To address this issue, the student and site mentor created videos and handouts demonstrating exercises commonly given to clients as a home exercise program. The product materials were organized based on the Ecological of Human Performance framework (Dunn et al., 1994).

Conclusion: The results of the literature review and feedback from the site mentor guided the development of this product. The product contains a series of short videos demonstrating common home exercise programs that this facility regularly prescribes, along with handouts demonstrating the exercises. This product assists with promoting adherence to home exercise

programs by addressing the client's learning style and preference to the type of home exercise program they will receive.

CHAPTER I

Introduction

Problem Statement

Roughly 1,100 per 100,000 persons experience an upper-extremity injury per year including burns, fractures, or amputations (Ootes et al., 2012). It has been shown that upper-extremity injuries can impact a person's physical function, activities of daily living (ADLs), social, psychological, and financial aspects in life (Che Daud et al., 2016b). These statistics warrant the need for occupational therapy practitioners specializing in hand therapy, and other hand therapists to address these areas of client's lives that have been affected by their upper extremity injury.

A hand therapist is either an occupational or physical therapist specializing in treating clients with an injury, disease, or surgery affecting the hands and upper extremities (American Society of Hand Therapists [ASHT], n.d.). Treatment often starts right after the injury or surgery and can continue for weeks or even months depending on the type of injury or surgery. The treatment starts with an evaluation to identify deficits the client may be experiencing and collecting data such as their current range of motion and strength. The information from the initial evaluation is then used to create a plan of care and to identify the types of interventions that will be used in following sessions. Typical hand therapy interventions include physical agent modalities, such as thermal therapy, electrical stimulation, and ultrasound. They also consist of scar tissue management, education, manual therapy, and exercises to help increase motion, dexterity, and strength. Another main aspect in the plan of care are home exercise programs which are prescribed by the hand therapist for the client to work on outside of the

facility to increase rehabilitation in the impacted upper extremity. However, Wright et al. (2014), stated that the rates of non-adherence to home exercise programs can be as high as 50-65 percent. These low levels of adherence often impact the effectiveness of rehabilitation and can lead to reoccurrence of injuries, difficulty with managing long-term conditions such as arthritis, increases in pain levels, and diminished function (Lang et al., 2022).

Purpose Statement

Based on the findings previously listed, the purpose of the project was to increase the rates of adherence to home exercise programs in order to improve the effectiveness of rehabilitation. The project was completed by addressing different factors that can impact home exercise programs. Some of the factors that were considered while developing the product included learning styles of the clients, the client-practitioner relationship, and the number of exercises given to clients. The product is primarily housed on YouTube and the hand therapy clinics website, as well as additional paper handouts for clients to access at any time.

Theoretical Framework

The occupation-based model that guided the needs assessment, literature review and product is the Ecology of Human Performance (EHP) framework (Dunn et al., 1994). The main constructs that make up this framework are the person, context, and task with the combination and outcome of these three constructs being the performance range (Dunn, 2017). For this project, the person is individuals with an upper extremity injury including their interests, values, and past experiences as well as their upper extremity deficits (Dunn, 2017). The context is broken down further into the client's physical, social, temporal, and cultural context (Dunn, 2017). The physical context includes the natural and built environments within the client's home

as well as the objects within their homes, while the social context includes their friends, family, and care providers (Dunn, 2017). The physical and social context was taken into consideration throughout this project due to not everyone having the technology needed to view online exercise programs as well as not having someone at home to help with the exercises. The temporal context includes the person's age, the stage of life which they are in, and their health status (Dunn, 2017). The cultural context is Fargo, ND and surrounding areas, and includes any rules of behavior or set expectations the person might have (Dunn, 2017). For this project, the task includes engagement in the client's prescribed home exercise program. The performance range is the outcome that is achieved when the person can interact within their context to perform tasks that they want or need to (Dunn, 2017). Lastly, occupational therapists intend to increase the performance range by providing services targeting combinations of the person, context, or task through intervention strategies including establish/restore, alter, adapt/modify, prevent, and create (Dunn, 2017).

Significance of Project

This project is significant in the area of hand therapy due to the amount of home exercise programs given to clients in this setting. This project will provide different ways for staff to prescribe home exercise programs based on the client's learning style (visual, aural, reading/writing, or kinesthetic), context, and preference. These factors were addressed in hopes to increase adherence to home exercise programs to enhance the client's performance range and improve their quality of life.

CHAPTER II

Literature Review

In 2020, roughly 246,910 upper extremity injuries occurred in the United States, which included fractures, sprains, burns, along with others (US Bureau of Labor Statistics, n.d.). Che Daud et al. (2016b), stated that upper-extremity injuries can impact a client's physical function, activities of daily living (ADL), social, psychological, and financial aspects in their daily lives. These statistics warrant the need for occupational therapy practitioners specializing in hand therapy, and other hand therapists to address these areas of client's lives that have been affected by their upper extremity injury. A hand therapist specializes in treating clients with any condition that affects the hands and upper extremities. Hand therapists can treat clients by assessing them, providing treatment in a facility or clinic type setting, and giving the client a home exercise program depending on the diagnosis (ASHT, 2022).

Home exercise programs are often given out to clients throughout the therapy process depending on what stage of their protocol they are in. These exercise programs are typically given as a handout with pictures and descriptions of the exercises which can address multiple factors including strengthening and increasing range of motion. Home exercise programs and their adherence to them are important for the client so they can gain the skills needed at home to complete daily functional tasks and so the therapist can focus on different factors impacting the client's performance range during the therapy sessions (Picha & Howell, 2018).

Upon a thorough review of the literature, it was found that there are different factors that can impact a client's adherence to their prescribed home exercise program. It has even been shown that the rates of non-adherence to home exercise programs can be as high as 50-65%

(Wright et al., 2014). These low levels of adherence often restrict the effectiveness of rehabilitation and can lead to reoccurrence of injuries, difficulty with managing long-term conditions such as arthritis, increases in pain levels, and diminished function (Lang et al., 2022). Some of the factors that can affect adherence include age, gender, the practitioner's race, education level, the client-practitioner relationship, and learning styles (Harte & Law, 2019; Valdes & Campbell, 2017; Wright et al., 2014). Through this project, these factors were taken into consideration while trying to improve adherence for the prescribed home exercise program to improve the outcomes of the client's rehabilitation.

Theory

This literature review was analyzed through the lens of the EHP (Dunn et al., 1994). This framework is broken down into three categories including the person, context, and task. By looking at the relationship between these categories, you can see a person's performance range, which is the demonstrated abilities of a person to complete tasks in different situations (Dunn, 2017). The person is broken down into subcategories that consist of "past experiences, personal values and interests, sensorimotor, cognitive, and psychosocial skills" (Dunn, 2017, p.210-211). Context includes the temporal, physical, social, and cultural environments that surround the person. Lastly, tasks are behaviors that are observed in order to achieve an outcome (Dunn, 2017). During the examination of the literature, the person was defined as those people who received home exercise programs, the context was their physical, social, and cultural environment, and the task was the home exercise program itself. The breadth of capacity for occupational performance that the factors allow for is the performance range.

Learning Styles

Harte and Law (2019), discussed the use of different learning styles to improve adherence to home exercise programs. The purpose of this study was to look at different ways to incorporate VARK (Visual, Aural, Read/write, Kinesthetic) techniques (Fleming & Mills, 1992) to engage clients with differing learning styles. They also found that therapists typically prescribe exercises with written and verbal instructions along with demonstration and practice. Some of the ways they incorporated these into a therapy setting were by using visual props, descriptive words, simple instructions, illustrations, and hands-on practice. This study found that therapists having an overall awareness of VARK principles can help improve adherence to home exercise programs depending on a client's learning style.

Valdes and Campbell (2018), completed a study focusing on the client's preference for home exercise programs. The purpose of this study was to distinguish if the participants preferred a paper handout for their home exercise program or a video. This study was completed using a mixed methods cross-sectional design for clients who had been receiving outpatient hand therapy services. They gave a survey to the participants to determine their preference for home exercise program, along with six open ended questions to determine why that was their preferred method. Out of the participants, nearly three-quarters of participants reported preference of a home exercise program that was in video format, nearly one-quarter preferred a paper copy, and the other participants preferred a video and paper copy. It was discussed that the reasoning for these results were that the paper copies were easier to access, however the videos were more comprehensive due to hearing the verbal directions.

It was seen through these two studies that learning styles are an important piece to home exercise programs, however the client's preferred method should still be taken into consideration

when creating an exercise program (Harte & Law, 2019; Valdes & Campbell, 2018). For example, if a client's learning style is through reading/writing, they may still prefer a video demonstration to get a more comprehensive explanation of the exercise. This will help inform the project by identifying a client's learning style, as well as asking for their preference.

Factors Impacting Adherence

Wright et al. (2014), completed a study looking at different factors that can impact client adherence to home exercise programs. Through their study they found that about 50-65% of people do not adhere to their prescribed home exercise program. The purpose of their study was to look deeper and try to understand why the rates of non-adherence are as high as they were. For this study they had 87 participants, and to be a participant they had to be already receiving therapy services and already having been provided with a home exercise program. It was shown in the study that factors that cannot be easily changed, such as age, demographics, or gender, were not affecting adherence to the home exercise program. However, one of the limitations that was found from this study was that most of the participants were women, making it difficult to say it is generalizable for the overall geographic population. One of the biggest factors Wright et al. (2014) found that impacted adherence was the patient-practitioner relationship, specifically looking at the communication between the patient and practitioner. The therapy practitioners who had the most success in facilitating client's adherence used things such as reminders, patient education, and counseling to improve the patient-practitioner relationship.

A systematic review by Essery et al. (2017), was used to explore factors conducive to adherence to home exercise programs to identify why the rates of non-adherence are so high. Through this study they focused on factors that seemed to correlate with client adherence to a home exercise program, including self-motivation, self-efficacy, previous adherence, and social

support. Having a better understanding can help practitioners determine when to increase interventions that foster these factors in order to promote their client's adherence to home exercise programs.

Interventions

McLean et al. (2010), completed a systematic review looking at different interventions to increase adherence with therapy. They focused on cognitive-behavioral programs, such as a motivational program and having a 10-minute counseling session prior to exercise, and how they can impact a client's adherence to therapy services. Through this study, they found that cognitive-behavioral programs can help improve short-term (three-month follow-up) adherence to therapy, but did not maintain adherence beyond three months from the start of therapy. They also found that combining cognitive, behavioral, and affective components were more effective than providing a single intervention for adherence.

Occupation-Based Interventions

Collis et al. (2020), completed a systematic review analyzing the influence of engaging in purposeful occupations and simulated activities on upper extremity motor performance in healthy and injured populations. They stated that engagement in purposeful activities often led to better and more movement than activities that did not have a purpose for a client (Collis et al., 2020). Some of the occupations they noted in the studies included personal care, writing, meal preparation tasks, and woodworking. With those occupations, researchers reviewed the quantity and quality of motion by observing movement speed, repetitions, duration, and reaction time. They also discussed that occupation-based approaches are starting to appear more in practice for

upper extremity injuries than in the past, but occupation-based approaches are still less promoted than other types of interventions such as rote exercise.

Evidence supports that using occupation-based interventions is rewarding yet challenging (Che Daud et al., 2016a). Some therapists have claimed that they lacked the creativity to use different types of interventions and others said it was just time-consuming. However, the literature also included evidence that using occupation-based interventions were beneficial to the client's treatment. Earley and Shannon (2006), described how using occupation as an intervention during a case study resulted in improvements in treatment outcomes and overall motivation for therapy. Through these three studies, the use of occupation-based interventions has shown to improve overall treatment in clients with upper extremity injuries (Che Daud et al., 2016a; Collis et al., 2020; Earley & Shannon, 2006). From these studies, it can be postulated that incorporating occupations into a client's home exercise program could help improve adherence.

Conclusion

Findings from this literature review suggest that there are many factors that can impact adherence to home exercise programs that have been prescribed to clients (Harte & Law, 2019; Valdes & Campbell, 2017; Wright et al., 2014). Occupational therapy practitioners have a role in facilitating client adherence to home exercise programs by building rapport with clients, educating the client on why they need to be completing their home program, and giving simple instructions to clients (Wright et al., 2014). It has also shown how taking client factors into account and completing occupation-based interventions can impact the outcomes of therapy (Che Daud et al., 2016a; Collis et al., 2020; Earley & Shannon, 2006; McLean et al. 2010). The

findings from this literature review were used to create ideas for the project to improve adherence to home exercise programs in a hand therapy-based setting.

CHAPTER III

Methods

Literature Review Process

This scholarly project was designed to provide varying educational materials for staff and clients that would aim to increase adherence to a client's home exercise program in a hand therapy setting. The first step in development of this project was a thorough review of current literature using databases available through the University of North Dakota (UND) School of Medicine and Health Sciences Library. The literature search was conducted through PubMed and CINHAL, as well as Google Scholar. The following key terms and phrases were utilized to access relevant information: hand therapy, adherence, home programs/home exercise programs, learning styles, and interventions/treatment. Other information was also obtained from occupational therapy textbooks regarding common hand therapy diagnoses, teaching and learning theories, and interventions used in a hand therapy setting. The inclusion criteria for the literature search were participants over the age of 18-years-old, full text research articles published between 2012 and 2023, apart from the case report completed by Earley and Shannon (2006), and had to be in English language or translated to English language focusing on individuals who are receiving or have received therapy services. Following the literature review, the next step of the process was compiling the results into a literature matrix to help organize the research and to determine the needs for the project. The need for the project was also emphasized from the site mentor in an interview prior to starting the literature review.

The last step in the project design following the completion of the interview, literature review, and needs assessment was creating the resources. The proposed project identified by the

site mentor was educational videos and handouts demonstrating home exercise programs that are typically prescribed, focusing on clients with upper extremity deficits. The different forms of the home exercise programs were aimed to be individualized for clients depending on their learning styles and their meaningful occupations. In order to identify the type of home program the client would receive, VARK Questionnaire results were analyzed (Flemming & Mills, 1992). The results of the questionnaire would determine the best way to prescribe the clients home exercise program, whether it be through videos (visual and aural), handouts (reading/writing), or a detailed demonstration in the therapy sessions (kinesthetic).

Project Development

To begin creating the project, videos were created which provided education on numerous exercises focusing on increasing passive range of motion, active range of motion, and strength. Along with the videos, handouts were also created which included a picture of the exercises as well as a small description of them. The site mentor did the speaking and explanations throughout the videos in order to remain consistent for current and future clients, while the student did the recording, editing, and uploading to YouTube along with creating the handouts. The videos and handouts used common language and avoided any medical jargon to create a more client-centered product that people could easily understand. The project was also structured to be easily adapted and added to by staff and future students at the facility. Toward the end of the doctoral experiential placement, the site mentor was educated on how to record, edit, and upload videos in order to add to the project in the future.

Theoretical Framework

For this scholarly project, EHP was used to analyze all aspects of the client including their environment and tasks that they do throughout the day (Dunn et al., 1994). The person was defined as the clients who received or will be receiving home exercise programs. To address the person factors, the client received the VARK Questionnaire version 8.01 (Fleming & Mills, 1992) to determine their learning style to aid the process of prescribing a home exercise program during the initial evaluation. If the client scored high in the visual and aural aspects of the questionnaire, they were given the link to the video demonstrations. When the client scored high in the reading/writing section, they were given a handout on the exercises to complete. Lastly, if the client scored high in the kinesthetic section, the exercises were demonstrated in the session as well as receiving a handout to reference if needed. The context was defined as their physical, social, and cultural environment to determine the best home exercise program for them. For example, the client may not have the technology at home to view the online exercise program (physical or cultural), or they may not have anyone at home to help with certain exercises (social). The task was the home exercise program itself. These factors were addressed in hopes to increase the client's performance range, which would be the adherence to the home exercise programs.

Chapter IV

Product

The purpose of this project was to find ways to increase adherence to home exercise programs in a hand therapy setting. To do this, multiple short videos and paper handouts were created to educate and demonstrate the client's home exercises. Some of the exercises that were included were finger and wrist range of motion such as flexion and extension, as well as strengthening with weights, putty/foam blocks, and against gravity. The videos ranged from five minutes to ten minutes depending on the number of exercises given in each one, and handouts were created using images from the videos with a small description of the action being completed. There were a total of six videos with accompanying handouts including thumb, finger, and wrist exercises. All the videos included a small introduction to what exercises would be performed throughout the video and the demonstration on how to properly complete the exercises. The handouts followed closely with the videos and used a similar description of the exercise that was used in the videos. The handouts also included a section of what occupations may be completed using the same motions as the exercises, such as turning a key for wrist supination and pronation or holding a toothbrush for finger flexion.

Theory

The project was informed by EHP to address aspects of the person, context, and task in order to increase the client's overall performance range (Dunn, 2017). The interventions used in the project from EHP included establish/restore and adapt/modify (Dunn, 2017). Establish/restore was primarily used for things such as strengthening or increasing range of motion needed to complete daily occupations. Adapt/modify was used if the client was unable to

complete certain exercises due to current deficits, for example if the client was not able to fully supinate their forearm, they would have had to adapt how they completed tasks or exercises.

Chapter V

Summary

The purpose of this scholarly project was to increase clients' adherence to home exercise programs that were prescribed by the therapist in a hand therapy setting. A literature review was completed to identify barriers to adherence to home exercise programs and the impact of not adhering to them. From the literature, it was found that rates of non-adherence can be as high as 50-65 percent (Wright et al., 2014). These low levels of adherence often restrict the effectiveness of rehabilitation and can lead to reoccurrence of injuries, difficulty with managing long-term conditions such as arthritis, increases in pain levels, and diminished function (Lang et al., 2022). The literature also yielded results showing different factors that can affect adherence such as age, gender, the practitioner's race, education level, the client-practitioner relationship, and learning styles (Harte & Law, 2019; Valdes & Campbell, 2017; Wright et al., 2014). The main factor that guided this project were the client's learning style, along with EHP factors from the person, context, task, and performance range (Dunn, 2017).

Strengths

One of the biggest strengths for this product is addressing levels of non-adherence to home exercise programs to help improve the effectiveness of rehabilitation in a hand therapy-based setting. The product also addresses factors individualized to the client to incorporate a more client-centered practice. Lastly, the product encompasses concepts that contribute to non-adherence to home exercise programs to help improve the client's quality of life by increasing their ability to engage in the occupations they want and need to.

Limitations

One limitation to this scholarly project was that the author had limited clinical experience shadowing and engaging in hand therapy treatments while on level II fieldworks, however, guidance from the site mentor was provided throughout the whole placement. Another limitation was the amount of time the product was tested due to being limited to 14-weeks on the doctoral experiential placement, so the product may require changes in the future. This product also requires the skills of recording, editing, and uploading videos on YouTube in order to expand it, as well as being able to create the handouts on new exercises. The last limitation was the size of the caseload the project was tested on. The project was tested on a small number of clients due to limited referrals to the site at this time.

Implications

This scholarly project is intended for use in settings where occupational therapy practitioners specializing in hand therapy are employed and treat clients. The author suggests that the product first be implemented at the hand therapy clinic, where the product was first developed. However, the product could be expanded to other areas of practice in the future with adjustments to address deficits outside of a hand therapy scope.

Future Recommendations

One recommendation for this product is future testing on a larger client base to identify the success of it. In addition to that recommendation, the author recommends that the product be expanded on by future students at the facility or other healthcare professionals specializing in a hand therapy-based setting. To assist the site mentor with future expansion of the product the

author educated them on how to record, edit, and upload videos to add to the YouTube channel and how to create the handouts that were created.

References

Che Daud, A. Z., Yau, M. K., Barnett, F., & Judd, J. (2016a). Occupation-based intervention in hand injury rehabilitation: Experiences of occupational therapists in Malaysia. *Scandinavian Journal of Occupational Therapy*, *23*(1), 57–66. https://doi.org/10.3109/11038128.2015.1062047

Che Daud, A. Z., Yau, M. K., Barnett, F., Judd, J., Jones, R. E., & Muhammad Nawawi, R. F. (2016b). Integration of occupation-based intervention in hand injury rehabilitation: A randomized controlled trial. *Journal of Hand Therapy*, *29*(1), 30–40. https://doi.org/10.1016/j.jht.2015.09.004

Collis, J. M., Signal, N., Mayland, E., & Wright-St Clair, V. A. (2020). Influence of purposeful activities on upper extremity motor performance: A systematic review. *Occupational Therapy Journal of Research: Occupation, Participation and Health*, *40*(4), 223–234. https://doi.org/10.1177/1539449220912187

Dunn, W. (2017). The ecological model of occupation. In J. Hinojosa, P. Kramer, & C. B. Royeen (Eds.), *Perspectives on human occupation theories underlying practice* (2nd ed., pp. 207-235). F.A. Davis Company.

Dunn, W., Brown, C., & McGuigan, A. (1994). The ecology of human performance: A framework for considering the effect of context. *American Journal of Occupational Therapy*, *48*(7), 595- 607. https://doi.org/10.5014/ajot.48.7.595

Earley, D., & Shannon, M. (2006). The Use of occupation-based treatment with a person who has shoulder adhesive capsulitis: A case report. *American Journal of Occupational Therapy*, *60*(4), 397–403. https://doi.org/10.5014/ajot.60.4.397

Essery, R., Geraghty, A. W., Kirby, S., & Yardley, L. (2017). Predictors of adherence to home-based physical therapies: A systematic review. *Disability and rehabilitation*, *39*(6), 519–534. https://doi-org.ezproxylr.med.und.edu/10.3109/09638288.2016.1153160

Fleming, N. & Mills, C. (1992). Not another inventory, rather a catalyst for reflection. *To Improve the Academy, 11,* 137. https://doi.org/10.1002/j.2334-4822.1992.tb00213.x

Harte, D., & Law, L. (2019). Incorporating different learning styles into a home exercise program. *Journal of Hand Therapy*, *32*(1), 128–132. https://doi.org/10.1016/j.jht.2017.08.008

Lang, S., McLelland, C., MacDonald, D., & Hamilton, D. F. (2022). Do digital interventions increase adherence to home exercise rehabilitation? A systematic review of randomized controlled trials. *Archives of Physiotherapy*, *12*(1), 24. https://doi.org/10.1186/s40945-022-00148-z

McLean, S. M., Burton, M., Bradley, L., & Littlewood, C. (2010). Interventions for enhancing adherence with physiotherapy: A systematic review. *Manual therapy*, *15*(6), 514–521. https://doi.org/10.1016/j.math.2010.05.012

Ootes, D., Lambers, K. T., & Ring, D. C. (2012). The epidemiology of upper extremity injuries presenting to the emergency department in the United States. *Hand (New York, N.Y.)*, *7*(1), 18–22. https://doi.org/10.1007/s11552-011-9383-z

Picha, K. J., & Howell, D. M. (2018). A model to increase rehabilitation adherence to home exercise programmes in patients with varying levels of self-efficacy. *Musculoskeletal Care*, *16*(1), 233–237. https://doi.org/10.1002/msc.1194

U.S. Bureau of Labor Statistics. (n.d.). *Survey of occupational injuries and illnesses data*. Retrieved June 22, 2022, from https://www.bls.gov/iif/soii-data.htm#charts

Valdes, K., & Campbell, A. (2017). Patient preferences for home exercise program provision: A patient survey. *American Journal of Occupational Therapy*, *71*(4_Supplement_1), 7111510186p1. https://doi.org/10.5014/ajot.2017.71S1-PO3145

What we do. (n.d.). *American Society of Hand Therapists (ASHT)*. Retrieved February 20, 2023, from https://asht.org/about/what-we-do

Wright, B., Galtieri, N., & Fell, M. (2014). Non-adherence to prescribed home rehabilitation exercises for musculoskeletal injuries: The role of the patient-practitioner relationship. *Journal of Rehabilitation Medicine*, *46*(2), 153–158. https://doi.org/10.2340/16501977-1241

APPENDICES

APPENDIX A

Home Exercise Handout Table of Contents

FINGER BLOCKING

Complete _____Reps _____X Per Day

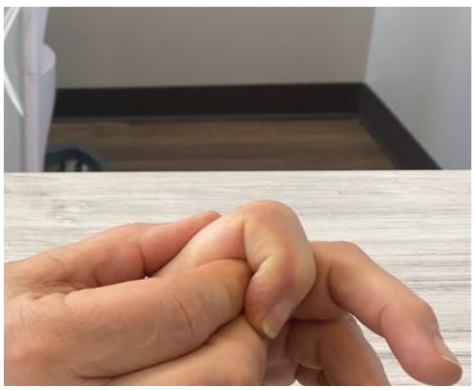
Finger Tip Flexion/Extension

- Start by holding just below the joint of the finger tip
- Next, bend the tip of the finger to the end range
- Last, straighten the tip of the finger making sure to fully extend it back as far as it will go

Occupations using these motions:

- Typing on a keyboard
- Getting dressed
- Holding a pot handle while cooking
- Picking up objects such as a computer or suit case
- Holding a toothbrush

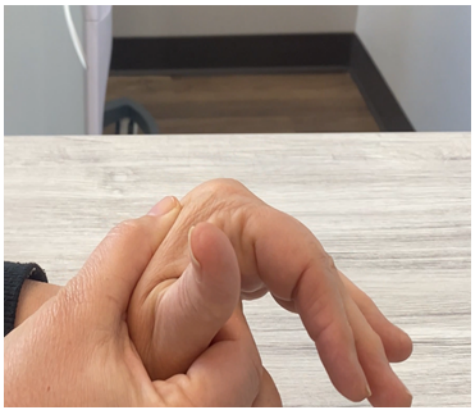
Middle Joint Flexion/Extension



- Start by holding just below the middle joint of the finger
- Next, bend the finger at the middle joint to the end range
- Last, straighten the finger making sure to fully extend it back as far as it will go

FINGER BLOCKING

Last Knuckle Flexion/Extension



- Start by holding just below the first joint of the finger
- Next, bend the finger at the first joint to the end range
- Last, straighten the finger making sure to fully extend it back as far as it will go

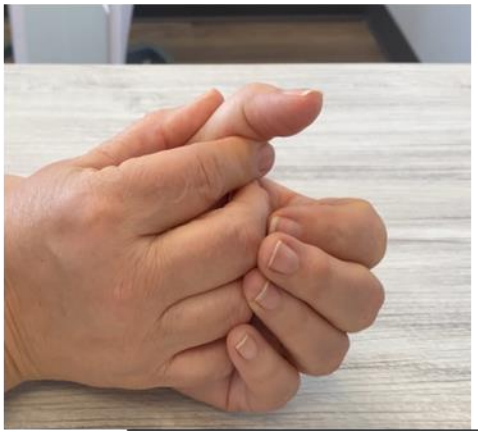
Signature

If you have any questions or concerns while performing your home program please call the number below

Thumb Range of Motion Exercises

Complete _____Reps _____X Per Day

Thumb Tip Flexion/Extension

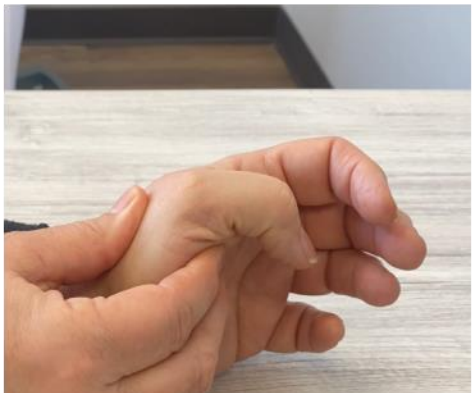


- Start by holding just below the first joint on the thumb
- Next, bend the tip of the thumb to the end range
- Last, straighten the tip of the thumb making sure to fully extend it back as far as it will go

Occupations using these motions:

- Pinching a key
- Holding a writing utensil
- Holding silverware
- Grabbing a cup/bottle
- Picking up small objects such as coins or puzzle pieces

Thumb Base Joint Flexion/Extension



- Start by holding the fatty part of the thumb just below the joint
- Next, bend the middle joint of the thumb to the end range
- Last, straighten the thumb making sure to fully extend it back as far as it will go

Thumb Range of Motion Exercises

Thumb Radial Abduction

- Start with the thumb resting next to the hand
- Next, bring the thumb straight up as if you are making an L shape
- Last, bring the thumb back down to the beginning position and repeat

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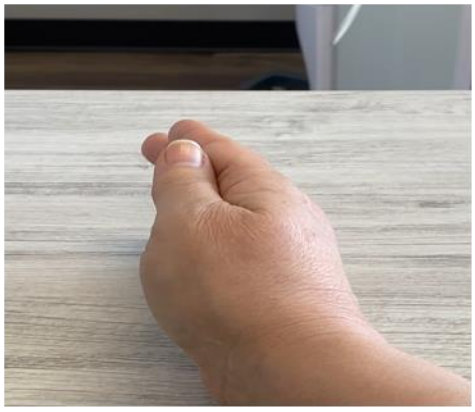
Thumb Palmar Abduction



- Start with the thumb resting next to the hand
- Next, bring the thumb straight out to the side as if you are making an L shape
- Last, bring the thumb back down to the beginning position and repeat

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Signature

If you have any questions or concerns while performing your home program please call the number below

Wrist Range of Motion Exercises

Complete _____Reps _____X Per Day

Wrist Flexion

- Start by holding your wrist over the edge of a table, armrest, etc. with the palm facing down
- Next, flex the wrist toward the floor
- Last, slowly bring the wrist back to the start position and repeat

Occupations using these motions:

- Turning the page in a book
- Petting a dog
- Eating
- Getting dressed
- Turning a screwdriver
- Opening a jar
- Turning a door knob/handle

Wrist Extension

- Start by holding your wrist over the edge of a table, armrest, etc. with the palm facing down
- Next, extend the wrist toward the ceiling
- Last, slowly bring the wrist back to the start position and repeat

Wrist Range of Motion Exercises

Radial and Ulnar Deviation

- Start by holding your wrist over the edge of a table, armrest, etc. with the thumb toward the ceiling and pinky toward the floor
- Next, bring the thumb up toward the ceiling
- Last, bring the pinky down toward the floor and repeat

Wrist Supination and Pronation

- Start by holding your wrist over the edge of a table, armrest, etc. with your palm facing down
- Next, rotate your wrist so that your palm is now facing up
- Last, rotate your wrist again so your palm is facing down and repeat

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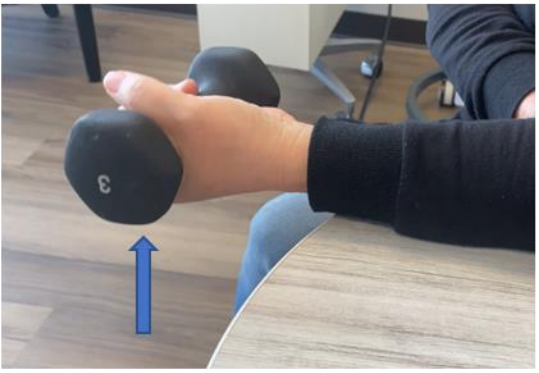
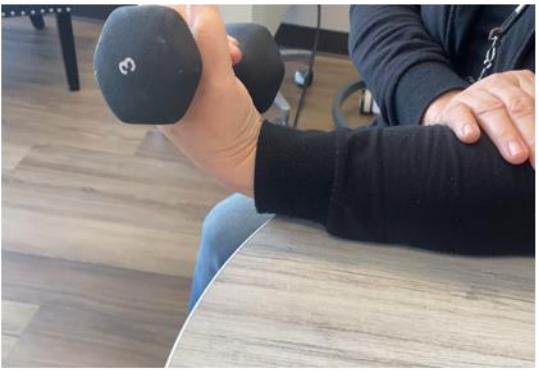
If you have any questions or concerns while performing your home program please call the number below

Wrist Strengthening Exercises

Complete _____Reps _____X Per Day_____ Weight

Wrist Flexion





- Start by holding the weight over the edge of a table, armrest, etc. with the palm facing up
- Next, flex the wrist toward the ceiling
- Last, slowly bring the wrist back to the start position and repeat

Occupations using these motions:

- Turning the page in a book
- Petting a dog
- Eating
- Getting dressed
- Turning a screwdriver
- Opening a jar
- Turning a door knob/handle

Wrist Extension

- Start by holding the weight over the edge of a table, armrest, etc. with the palm facing down
- Next, extend the wrist toward the ceiling
- Last, slowly bring the wrist back to the start position and repeat

Wrist Strengthening Exercises

Radial and Ulnar Deviation

- Start by holding the weight over the edge of a table, armrest, etc. with the thumb toward the ceiling and pinky toward the floor
- Next, bring the thumb up toward the ceiling
- Last, slowly bring the wrist back to the start position and repeat

Wrist Supination and Pronation

- Start by holding the weight over the edge of a table, armrest, etc. with your palm facing down
- Next, rotate your wrist so that your palm is now facing up
- Last, rotate your wrist again so your palm is facing down and repeat

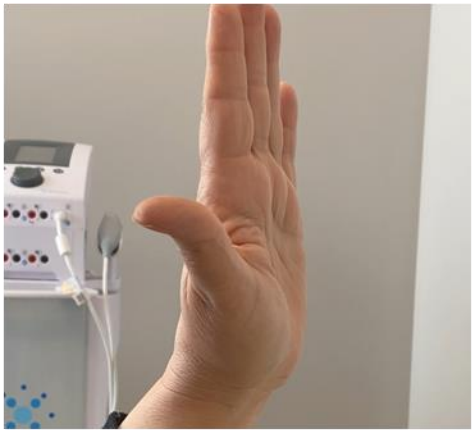
Signature

If you have any questions or concerns while performing your home program please call the number below

Tendon Glides

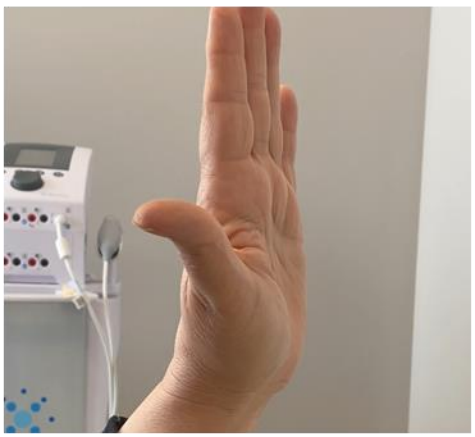
Complete _____Reps _____X Per Day

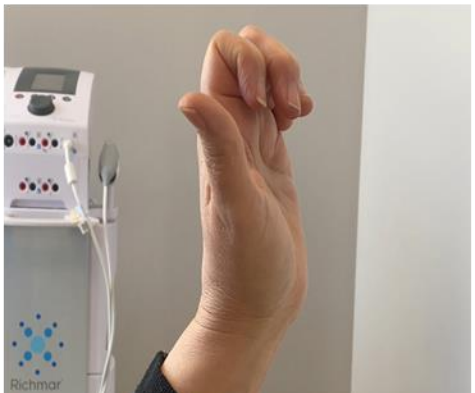
Table Top



- Start with your hand completely open and straight
- Bend your fingers into a flat fist while keeping the end joints of the fingers straight
- Return to an open hand and repeat

Hook Fist





- Start with your hand completely open and straight
- Bend your last two joints of the fingers to make a hook shape keeping the first joint straight
- Return to an open hand and repeat

Tendon Glides

Full Fist

- Start with your hand completely open and straight
- Bend your fingers into a full fist
- Return to an open hand and repeat

Opposition

- Start with an open palm and fingers extended
- Next, touch the tip of your thumb to each finger tip
- Return to an open hand and repeat

Signature

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Putty Strengthening Exercises

Complete _____Reps _____X Per Day

Finger Squeeze

- Start by holding the putty in your palm
- Next, squeeze the putty slowly and gently with your fingers
- Last, reposition the putty in your palm and repeat

Occupations using these motions:

- Using power tools
- Getting dressed
- Cooking a meal
- Golfing
- Making your bed
- Showering
- Brushing your teeth
- Holding a child

Tip Pinch

- Start by holding the putty between your thumb, index, and middle finger
- Next, pinch the putty using the three fingers stated above
- Last, reposition the putty and repeat

Putty Strengthening Exercises

Lateral Pinch

- Start by holding the putty between your thumb and on top of your index finger, as if you are turning a key
- Next, pinch the putty with your thumb
- Last, reposition the putty and repeat

Pad Pinch

- Start by holding the putty between the affected finger and thumb
- Next, pinch using the pads of the finger tips
- Last, reposition the putty and repeat

Putty Strengthening Exercises

Thumb Press

- Start by holding the putty in your palm with your thumb on top
- Next, slowly flex the thumb down into the putty
- Last, reposition the putty and repeat

Thumb Extension

- Start by wrapping the putty around your thumb
- Next, extend the thumb straight up stretching the putty out
- Last, reposition the putty and repeat

(Use a thinner wrap for less resistance)

Putty Strengthening Exercises

Thumb Abduction

- Start by wrapping the putty around your thumb
- Next, slowly bring your thumb out to the side
- Last, reposition the putty and repeat

(Use a thinner wrap for less resistance)

Individual Finger Extension

- Start by wrapping the putty around the affected finger/fingers
- Next, extend the finger straight and stretch the putty
- Last, reposition the putty and repeat

(Use a thinner wrap for less resistance)

Putty Strengthening Exercises

Thumb Adduction

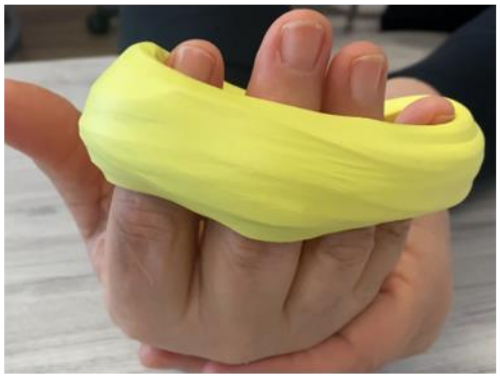
- Start by holding the putty between the thumb and index finger
- Next, bring the thumb inward and squeeze the putty into the index finger
- Last, reposition the putty and repeat

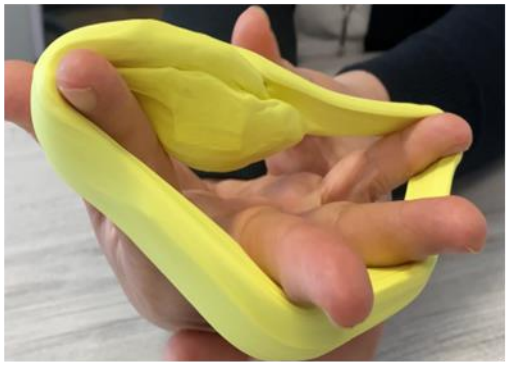
Finger Extension

- Start by flattening the putty out onto a table
- Next, place your fingers on the putty and extend them to skim across the top of the putty
- Last, reposition the putty and repeat

Putty Strengthening Exercises

Finger Spread





- Start by wrapping the putty around your four fingers
- Next, spread your fingers apart stretching the putty
- Last, reposition the putty and repeat

Wrist Extension & Pinch

- Start by grabbing the putty with your affected hand
- Next, extend the wrist back stretching out the putty
- Last, reposition the putty and repeat

Signature

If you have any questions or concerns while performing your home program please call the number below

APPENDIX B

VL

VARK Learn <contact@vark-learn.com>

To: Ellis, Austin

Wed 2/22/2023 3:22 PM

Dear Austin,

Your request to use VARK copyright materials (specifically the VARK questionnaire and helpsheets) in your capstone project is approved.

Approval is on the following conditions:

1. the results of your project are not published - if you are undertaking such, we would require further details of your research before we could consider granting copyright permission.

2. you must find out the VARK preference for each student and share that information with them. When you use paper copies of the questionnaire (https://vark-learn.com/wp-content/uploads/2014/08/The-VARK-Questionnaire.pdf), you will be able to work out the total scores for Visual, Aural, Read-Write and Kinesthetic, but you will not be able to find out the resulting VARK preference. It is not appropriate to just choose the modality with the highest score, as a majority of people have a multimodal learning preference. Your options for finding out the VARK preferences are to either:

    a) purchase a VARK result analysis from us (https://vark-learn.com/product/vark-result-analysis/). You will then be able to send us a spreadsheet containing the total scores for V, A, R and K for each student, and we will analyze their scores and return the spreadsheet to you with an additional column showing the VARK preferences. There is a cost of US$25 for this service, and you should allow 2 working days for us to get the analysis back to you.

    b) direct the students to fill in the VARK questionnaire online at the https://vark-learn.com website. They will then automatically find out their VARK preference when they have completed the questionnaire. If you then need their results, you will need to ask them to report their preference back to you. There is no fee for using the online version of the VARK questionnaire.

Please note that you may not place VARK copyright materials online or on another website, whether password protected