



---

MSU Graduate Theses

---

Spring 2016

## Acceptance And Commitment Therapy (ACT) And Physical Therapy Adherence

Jennifer Ashley Battles

As with any intellectual project, the content and views expressed in this thesis may be considered objectionable by some readers. However, this student-scholar's work has been judged to have academic value by the student's thesis committee members trained in the discipline. The content and views expressed in this thesis are those of the student-scholar and are not endorsed by Missouri State University, its Graduate College, or its employees.

---

Follow this and additional works at: <https://bearworks.missouristate.edu/theses>



Part of the [Psychology Commons](#)

### Recommended Citation

Battles, Jennifer Ashley, "Acceptance And Commitment Therapy (ACT) And Physical Therapy Adherence" (2016). *MSU Graduate Theses*. 2378.

<https://bearworks.missouristate.edu/theses/2378>

This article or document was made available through BearWorks, the institutional repository of Missouri State University. The work contained in it may be protected by copyright and require permission of the copyright holder for reuse or redistribution.

For more information, please contact [BearWorks@library.missouristate.edu](mailto:BearWorks@library.missouristate.edu).

**ACCEPTANCE AND COMMITMENT THERAPY (ACT) AND PHYSICAL  
THERAPY ADHERENCE**

A Masters Thesis

Presented to

The Graduate College of

Missouri State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Science, Psychology

By

Jennifer Battles

May 2016

Copyright 2016 by Jennifer Ashley Battles

# ACCEPTANCE AND COMMITMENT THERAPY (ACT) AND PHYSICAL THERAPY ADHERENCE

Psychology

Missouri State University, May 2016

Master of Science

Jennifer Battles

## ABSTRACT

Adherence to physical therapy rehabilitation is one of the most common issues physical therapists face with patients. Methods to improve physical therapy adherence have only been mildly successful, and many modalities fail to address psychological components that affect compliance. Acceptance and Commitment Therapy (ACT) is a third wave behavior analytic therapy that has recently been utilized to influence health behavior change through emphasizing mindfulness, values, and psychological. The current study evaluates the effectiveness of a brief ACT intervention on physical therapy adherence, including compliance with prescribed home exercises and attendance at sessions. Participants ( $n = 4$ ) with a range of physical injuries were recruited from a campus physical therapy clinic. Utilizing a single-subjects design, participants completed four individual ACT therapy sessions after measuring physical therapy adherence for a baseline period. Data were collected for the entire duration each participant was in physical therapy, ranging from six to eight weeks. Additional questionnaires were administered prior to and following the ACT intervention that assessed values connectedness, mindfulness, psychological flexibility, distress tolerance, and pain acceptance. Results demonstrated that a brief ACT intervention improved patients' physical therapy and home exercise adherence. Future research should utilize randomized controlled trials to further evaluate the effectiveness of an ACT intervention in a physical therapy setting.

**KEYWORDS:** acceptance and commitment therapy (ACT), physical therapy, adherence, single-subjects design, psychological flexibility

This abstract is approved as to form and content

---

Ann Rost, PhD  
Chairperson, Advisory Committee  
Missouri State University

**ACCEPTANCE AND COMMITMENT THERAPY (ACT) AND PHYSICAL  
THERAPY ADHERENCE**

By

Jennifer Battles

A Masters Thesis  
Submitted to the Graduate College  
Of Missouri State University  
In Partial Fulfillment of the Requirements  
For the Degree of Master of Science, Psychology

May 2016

Approved:

---

Ann Rost, PhD

---

David Lutz, PhD

---

Wayne Mitchell, PhD

---

Julie Masterson, PhD: Dean, Graduate College

## **ACKNOWLEDGEMENTS**

I would to thank my thesis chair Dr. Ann Rost for her support and guidance over the past two years. Her mentorship through this graduate program has meant more to me than words can describe as I prepare for a future in this field. Her knowledge of Acceptance and Commitment Therapy (ACT) and passion for health psychology has helped me develop a research interest that will carry me through my doctorate and beyond.

I would also like to thank my other committee members, Dr. Wayne Mitchell and Dr. David Lutz, who have both been an integral part of my success in the clinical psychology master's program. The physical therapy clinic at Missouri State University helped make this project possible and without their constant support and communication, none of this would have been possible.

I also need to thank Dr. Danae Hudson and Dr. Brooke Whisenhunt who both have been my professional and personal mentors at Missouri State University for the past six years. They have both helped shape me into the person I am today and I cannot thank them enough for their dedication and support over the years.

Lastly, I would like to thank my family for their constant love and encouragement. My husband, John Battles, has been my rock through this whole process and has always been the one to tell me I can do anything. My parents, Linda and Jeffrey Barnes, have also been an incredible support system my entire life and they have taught me how to strive for and achieve any goal I have in mind.

## TABLE OF CONTENTS

Introduction .....	1
Physical Therapy Adherence .....	1
Acceptance and Commitment Therapy .....	3
Effectiveness of Acceptance and Commitment Therapy .....	7
Acceptance and Commitment Therapy and Health/Chronic Pain .....	9
Purpose .....	11
Hypotheses .....	11
Methods .....	13
Participants .....	13
Measures .....	14
Procedure .....	16
Results .....	20
Participant One .....	21
Participant Two .....	26
Participant Three .....	30
Participant Four .....	35
Discussion .....	40
Adherence to Physical Therapy .....	40
Adherence to Home Exercise .....	41
Questionnaire Data .....	42
Limitations .....	44
Future Directions .....	48
References .....	50
Appendices .....	57
Appendix A. Acceptance and Commitment Therapy Hexaflex .....	57
Appendix B. Demographics Questionnaire .....	58
Appendix C. Adherence Questionnaires .....	59
Appendix D. Outcome Questionnaire .....	61
Appendix E. Human Subjects IRB Approval .....	62
Appendix F. Intervention Protocol .....	64
Appendix G. Values Compass Example .....	67

## LIST OF TABLES

Table 1. Pre-and Post-Treatment Questionnaire Summary Scores for Participant 1.....	25
Table 2. Outcome Questionnaire Data for Participant 1 .....	25
Table 3. Pre-and Post-Treatment Questionnaire Summary Scores for Participant 2.....	29
Table 4. Outcome Questionnaire Data for Participant 2.....	30
Table 5. Pre-and Post-Treatment Questionnaire Summary Scores for Participant 3.....	34
Table 6. Outcome Questionnaire Data for Participant 3 .....	35
Table 7. Pre-and Post-Treatment Questionnaire Summary Scores for Participant 4.....	39
Table 8. Outcome Questionnaire Data for Participant 4.....	39



## LIST OF FIGURES

Figure 1. Patient Rated Physical Therapy Adherence for Participant 1 .....	22
Figure 2. Therapist Rated Physical Therapy Adherence for Participant 1 .....	22
Figure 3. Patient Rated Home Exercise Adherence for Participant 1 .....	23
Figure 4. Therapist Rated Home Exercise Adherence for Participant 1 .....	24
Figure 5. Patient Rated Physical Therapy Adherence for Participant 2 .....	26
Figure 6. Therapist Rated Physical Therapy Adherence for Participant 2 .....	27
Figure 7. Patient Rated Home Exercise Adherence for Participant 2 .....	28
Figure 8. Therapist Rated Home Exercise Adherence for Participant 2 .....	28
Figure 9. Patient Rated Physical Therapy Adherence for Participant 3 .....	31
Figure 10. Therapist Rated Physical Therapy Adherence for Participant 3 .....	31
Figure 11. Patient Rated Home Exercise Adherence for Participant 3 .....	32
Figure 12. Therapist Rated Home Exercise Adherence for Participant 3 .....	33
Figure 13. Patient Rated Physical Therapy Adherence for Participant 4 .....	36
Figure 14. Therapist Rated Physical Therapy Adherence for Participant 4 .....	36
Figure 15. Patient Rated Home Exercise Adherence for Participant 4 .....	37
Figure 16. Therapist Rated Home Exercise Adherence for Participant 4 .....	38

## **INTRODUCTION**

### **Physical Therapy Adherence**

One of the greatest predictors of patient outcome in physical therapy is adherence to the prescribed regime of rehabilitative exercise, both in the clinic and at home. Those who adhere closely to the designed treatment program report increased physical function and self-perceived benefits from physical therapy (Granquist & Brewer, 2013; Hubbard et al., 2012; Pisters et al., 2010). In one case, patients in physical therapy following surgical reconstruction of the anterior cruciate ligament (ACL) who adhere to rehabilitation recommendations have fewer self-reported knee symptoms following the end of treatment (Brewer et al., 2004). However, many patients do not adhere to the basic principles of their rehabilitation, such as attending physical therapy sessions and completing home exercise programs (Mazières et al., 2008). Sluijs, Kok, and Zee (1993) found that patient non-adherence to rehabilitation recommendations are as high as 70% over the course of treatment. Other researchers, who have tracked patients in physical therapy, report that of those given home-based exercise programs, almost 40% do not follow the recommended program (Forkan et al., 2014).

Patients indicate numerous barriers contributing to non-compliance such as lack of time for therapy exercises, lack of motivation, pain from the exercises, and forgetting to perform their therapy on a schedule (Sluijs, Kok, & Zee, 1993). Day-to-day variations in stress and mood also contribute to a patient's non-compliance. Brewer, Cornelius, Van Raalte, Tennen, and Armeli (2013) found that daily negative mood and life stressors contributed significantly to a patient's adherence in physical therapy sessions and home

exercise recommendations, while personality factors such as levels of neuroticism and optimism did not. Additionally, patients' level of perceived pain with an injury predicts adherence to physical therapy recommendations, where the more pain a patient expresses the less likely they are to adhere to physical therapy recommendations and therefore have a slower recovery (Millslagle, 2016; Sluijs, Kok, & Zee, 1993). Poor adherence does not seem to be a matter of occurring only at the end of treatment, but is equally poor at 12 and 48 months after clinic-based treatment (Forkan et al., 2014).

Some psychological methods of improving patient adherence to physical therapy have been mildly successful. Freidrich et al. (1998) implemented a motivational program with patients participating in physical therapy that consisted of counseling and educational sessions designed to emphasize the importance of regular exercise and reinforce patient's productive behavior as it occurred throughout treatment. The researchers found that patients who participated in the motivational group had increased rates of attendance at scheduled physical therapy sessions and increased short-term compliance, as compared to those in a control group. In another study, researchers used a goal-setting intervention in attempt to increase adherence to a lower back pain rehabilitation program. The intervention included helping patients create their own personalized goal profiles by prioritizing goals in treatment and discussing these goals at follow-up meetings throughout rehabilitation. The intervention group showed improved adherence to rehabilitation, but it was the relationship between the physical therapist and patient that appeared to be the largest predictor of patient adherence (Coppack, Kristensen, & Karageorghis, 2012). These interventions imply that adherence to physical therapy can be changed and positively affected by brief, targeted interventions.

However, there is still a need for more effective interventions targeting patient adherence both during and after clinic-based physical therapy. Interventions that target daily life stress, negative mood, and willingness to experience discomfort as opposed to specific psychological or personality factors may create the most impact on physical therapy adherence (Brewer, Cornelius, Van Raalte, Tennen, & Armeli, 2013; Sluijs, Kok, & Zee, 1993). One possible approach to improve physical therapy adherence may be Acceptance and Commitment Therapy (ACT).

### **Acceptance and Commitment Therapy**

Acceptance and Commitment Therapy is a third-wave behavior analytic approach to therapy that focuses on contextual variables, mindfulness, acceptance, behavior change, and values clarity. Acceptance and Commitment Therapy is a distinctive approach to promote behavior change that is supported by language theory and basic cognitive-behavioral concepts. The intervention is based on Relational Frame Theory (RFT), which offers an explanation for human suffering by analyzing language in society. Relational Frame Theory demonstrates that humans can arbitrarily relate objects, thoughts, and feelings to almost any other object, thought, or feeling through language processes. For example, when someone sees a beautiful sunset they may feel happy, yet that happiness could remind them of a time when they were sad. This relation happens because sad is the opposite of happy and our minds relate the two words together. Therefore, even when humans experience positive events in their life, they can be reminded of the negative events through relations made possible by language (Hayes & Smith, 2005; Hayes, Levin, Plumb-Villardaga, Villatte, & Pistorello, 2013). Interestingly,

this phenomenon is unique to humans because of the verbal world they have created. Animals are unable to produce these relations due to lack of language and the abstractive-comparison abilities allowed through language (Blackledge, 2003).

The purpose of ACT as a treatment is to increase psychological flexibility through defusion of language and frames, within the context of working to create a meaningful life for clients. Kashdan and Rotterburg (2010) explain psychological flexibility as a measure of how a person “adapts to fluctuating situational demands, reconfigures mental resources, shifts perspectives, and balances competing desires, needs, and life domains.” Others simplify it to mindfulness in the present moment and a change in behavior that leads to valued-based action (Hayes, 2014). Psychological flexibility can be conceptualized as how a person interacts with their environment and adapts to novel situations in context. In order to establish psychological flexibility, there are six key processes that need to be considered: acceptance, cognitive defusion, being present, self as context, values, and committed action. These six components of psychological flexibility are illustrated in the ACT Hexaflex in Appendix A.

From an ACT perspective, acceptance is being presently minded with an active state of awareness of the events going on around a person, without attempting to alter or fight the situation. The person is merely observing and embracing the moment as it is in time. This term is the opposite of experiential avoidance, or avoiding private experiences, such as unpleasant feelings or thoughts, and behaving in ways to change the events and contexts that cause the experience (Hayes & Wilson, 1994; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Once an individual accepts these uncomfortable experiences, they are able to develop a more flexible way of thinking and behaving in daily life.

Several possible behaviors are revealed once a person increases their psychological flexibility and an individual is able to connect these behaviors to their values (Siqueira & Oades, 2003).

Cognitive defusion is the process of taking a step back and looking at language without letting language influence behavior. This process involves acknowledging thoughts and emotions as private, transient events (words, sounds, and images) that are in a constant stage of change. Once thoughts or emotions can be defused, they play far less of a role in impacting behavior. Steps to promote cognitive defusion ultimately help create psychological flexibility (Harris, 2013). Defusion techniques are used in ACT “when there is any event that generates narrow and inflexible patterns of behavior, and when these inflexibilities are obstacles to our clients moving actively in the direction of a chosen value (Wilson & Murrell, 2004).”

One of the goals of ACT and psychological flexibility is for individuals to experience the world directly without judgment. Being in the present also involves embracing the moment with openness and interest while engaging fully in whatever task the person is performing at that time. Mindfulness based exercises are an integral part in the process of being present. Allowing oneself to be in the moment requires focus, voluntary willingness, and flexibility (Hayes, Levin, Plumb-Villardaga, Villatte, & Pistorello, 2013). Being psychologically present in the environment or context allows the person to behave in a flexible manner consistent with their values (Hayes, 2006). Since mindfulness can be done all the time, ACT treatment teaches clients to integrate mindfulness into daily life (Koren, 2015).

When experiencing language, humans perceive themselves through a particular verbal context that leads to a sense of self. For example, one might say, “I am an employee” or “I am hopeless.” Acknowledging this perspective can help people gain awareness of the present moment and experience the flow of events without attaching themselves to the thought. This can be referred to as observing the self or “accessing a transcendent sense of self, a continuity of consciousness that is unchanging, ever-present, and impervious to harm (Harris, 2013; Harris, 2006).” Experiencing the self as context can foster defusion and acceptance, ultimately increasing psychological flexibility (Hayes, 2014).

A value is a term to describe what is most important and meaningful to a person. One of the goals of ACT is to clarify a person’s values to ensure they can behave in ways that are consistent to those values. Understanding and communicating values are central to psychological flexibility and to the other five processes, because values help create meaning for engaging in behavior change (Harris, 2013). Values differ from goals. Goals must be achievable with set outcomes; values are lived in each moment and represent what a person stands for in life (Chase et al., 2013). For example, while parenting may be a strong value, the goals attached to that might include attendance at your child’s soccer games.

When individuals do not live in accordance with their values, committing to any type of behavior change becomes difficult and often impossible. For instance, a man is trying to exercise more frequently but struggles to maintain this behavior long-term. He combats resulting dissonance by justifying the lack of exercise and focusing his attention elsewhere; both of which become easier over time. However, someone who

acknowledges and sees the value of physical self-care will likely engage in continued exercise because of the meaning and purpose behind the activity (Hayes & Smith, 2005).

Taking effective action to live according to one's values fuses ACT and all the components of psychological flexibility together to work toward a common purpose. This component most similarly reflects behavior therapy, and ACT interventions work with behaviorally focused methods to encourage change and behavioral engagement (Hayes, 2014).

Overall, psychological flexibility from an ACT perspective is a way to promote valued-based action in individuals' lives by accepting thoughts and feelings, experiencing cognitive defusion with thoughts, contacting the present moment, observing the self, identifying values, and committing to action (Wilson & Murrell, 2004). Psychological flexibility within ACT has been used to help patients with physical and mental illness improve their quality of life and inherently reduce aversive symptoms (Gundy, Woidneck, Pratt, Christian, & Twohig, 2015; Forman, Herbert, Moitra, Yeomans, & Geller, 2007; Powers, Zum Vorde Sive Vording, & Emmelkamp, 2009).

### **Effectiveness of Acceptance and Commitment Therapy**

Acceptance and Commitment Therapy, as an intervention, has been shown to be effective for treating a wide variety of mental illnesses. Research has established ACT as an effective treatment for anxiety disorders, depression, substance use, obsessive-compulsive disorder, and posttraumatic stress disorder to name a few (Landy, Schneider, & Arch, 2015; Najvani, Neshatdoost, Abedi, & Mokarian, 2015; Lee, An, Levin, & Twohig, 2015; Twohig, Vilardage, Levin, & Hayes, 2015; Thompson, Luoma, &



LeJeune, 2013). A meta-analysis of 39 randomized controlled trials reviewed the efficacy of ACT and found that ACT interventions outperformed various control conditions at post-treatment and follow-up assessments with an average effect size of Hedges'  $g = .60$  (A-Tjak et al., 2015). Moreover, compared to traditional cognitive-behavioral therapy, ACT is just as effective or more effective at treating these various disorders (Arch, Wolitzky-Taylor, Eifert, & Craske, 2012; Losada et al., 2015). Several of these studies indicate that ACT offers a unique perspective in symptomology, and that certain aspects of the treatment protocol such as cognitive defusion, are useful concepts to explore even within the context to cognitive-behavior therapy.

Furthermore, ACT research has led to promising evidence for the general field of health psychology. Gundy, Woidneck, Pratt, Christian, and Twohig (2015) conducted a literature review of ACT related to health issues and reported that ACT is useful for health conditions such as epilepsy, diabetes, obesity, and cancer management. Specific health behaviors such as eating and physical activity can be targeted with ACT treatment as well. Weineland, Arvidsson, Kakoulidis, and Dahl (2012) demonstrated that a brief ACT intervention improved post bariatric surgery patients' disordered eating behaviors, body dissatisfaction, and acceptance of weight related thoughts and feelings significantly more than those who completed treatment as usual.

Similarly, researchers in a recent study showed that brief, electronic ACT interventions have an impact on physical activity initiation. Participants in a 12-week pedometer-based walking program were randomly assigned to receive either an ACT DVD with a walking program or the walking program by itself. The DVD provided a two-hour, self-managed ACT intervention that was adapted to target physical activity. It

included five modules each tailored to the core processes of ACT. Those who received the ACT DVD plus the walking program increased their physical activity level and were significantly more likely to meet program specific goals as compared to the walking program alone (Moffitt & Mohr, 2014). These findings suggest that ACT may be an effective tool for health behavior change across a wide spectrum of physical and mental problems.

### **Acceptance and Commitment Therapy and Health/Chronic Pain**

Beyond increasing patients' psychological flexibility and values clarity, ACT has also been shown to improve patients' quality of life in many different facets. One of the most noteworthy achievements is the consistent positive impact on quality of life shown following treatment of individuals. McCracken and Jones (2012) showed that after a brief ACT intervention with older adults experiencing chronic pain, participants improved their overall physical mobility and had reduced symptoms of depression. These results were still present three-months after completing the intervention.

Acceptance and Commitment Therapy for chronic pain has also been successful in a group format. McCracken & Gutierrez-Martinez (2011) conducted a study with over 160 participants who reported chronic pain, and who were seeking rehabilitative services due to their pain. A brief ACT-based intervention was administered weekly for three to four weeks, in conjunction with sessions concerning topics such as physical conditioning, anxiety management, and health education. The results of the study reveal that following group treatment and follow-up, participants indicated decreased pain-related anxiety, medical visits, and self-rated pain intensity. These findings are particularly important to

the current study as treatment of chronic pain is one of the most common reasons individuals attend physical therapy and is a major barrier to adherence (McCracken & Vowles, 2014; Buhrman et al., 2013; Wetherell et al., 2011).

Acceptance and Commitment Therapy interventions have also been effective in promoting physical activity. A study conducted with a college female population revealed that when comparing participants in an ACT intervention to a traditional educational intervention, those in the ACT group increased their physical activity levels significantly more and had greater willingness to commit to exercise-related values (Butryn, Forman, Hoffman, Shaw & Juarascio, 2011). Similarly, Ledley, Goodwin, Forman, Herbert, and Butryn (2012) conducted an acceptance-based intervention targeting cardiac patients' physical activity and diet practices. The authors reported that after four sessions of the intervention, participants had made improvements in their frequency of physical activity and reported healthier diet changes. The patients in this study also reported high levels of satisfaction with the intervention and a high degree of comprehension, suggesting that patients were more likely to comply with intervention recommendations.

Because ACT has been successfully applied to chronic pain and physical activity, it is likely that ACT will be an effective intervention to increase adherence and improve outcomes of physical therapy. However, only one known study has attempted to evaluate ACT in a physical therapy setting. Mahnoey and Hanranhan (2011) used a brief ACT intervention with four injured athletes who had recently undergone ACL reconstructive surgery, and were in the rehabilitation process of physical therapy. The authors reported that the intervention might be helpful for increasing acceptance of private events, commitment to rehabilitation behaviors, and certainty of returning to their sport. Though

this is a good initial study, the researchers did not include the full ACT model in treatment, but rather only a few pieces and techniques. However, the results do provide further evidence that ACT may be an applicable and useful invention in a physical therapy setting.

## **Purpose**

The purpose of this study is to evaluate the effectiveness of an ACT intervention in improving patient adherence to physical therapy sessions and home exercises. The intervention included the full model of ACT, and focused on acceptance and mindfulness to increase commitment, behavior change, and psychological flexibility in the context of valued living. Through the use of this intervention, we hope show to that the intervention can lead to increased mindfulness, distress tolerance, values clarity, and psychological flexibility, and result in greater adherence to physical therapy rehabilitation and living in accordance with one's values. Physical therapy adherence will be impacted through this intervention because participants will have the flexibility and distress tolerance skills needed to comply with the demanding recommendations of physical therapy. Participants will be more likely to attend physical therapy sessions and complete prescribed home exercises because they will understand the relevance of accomplishing goals in physical therapy as they relate to their broader life values.

## **Hypotheses**

Utilizing a single-subjects design, it is hypothesized that patients will have higher levels of adherence to their individual physical therapy treatment plan, including

attendance at physical therapy sessions and completion of prescribed home exercises following the introduction of the ACT intervention, as compared to baseline adherence measures. In addition, it is expected that patients will show increased psychological flexibility, distress tolerance, and values clarity after participating in the ACT intervention, as assessed by questionnaires administered at pre-treatment and post-treatment. Lastly, it is hypothesized that improvements in psychological flexibility, distress tolerance, and values clarity will relate to the outcome of increased physical therapy adherence.

## **METHOD**

### **Participants**

Participants were recruited from the physical therapy clinic at Missouri State University in Springfield, Missouri. All individuals saw the same physical therapist at the clinic and were in treatment for at least six weeks. Five people were invited to participate. One dropped out due to no longer needing physical therapy. As a result, data of four participants are presented.

Participant One was a 58-year-old, white female who worked as an online instructor and part-time massage therapist. She attended physical therapy due to chronic neck and back pain and had been diagnosed with scoliosis. She had recently injured her neck when moving items in her home leading to a referral for physical therapy. In addition to her pain condition, she also met criteria for social anxiety disorder and major depressive disorder. The participant reported seeing a counselor in the past, but was not currently in treatment for psychological issues.

Participant Two was a 21-year-old, white female who was a student enrolled at the university. She was attending physical therapy for a right wrist fracture that severely limited her range of motion. No relevant comorbid diagnoses existed.

Participant Three was a 76-year-old, white male who was a full-time college administrator preparing for retirement during treatment. He was referred to physical therapy following surgery for a fractured right kneecap. No relevant comorbid diagnoses existed.

Participant Four was a 61-year-old, Chilean female who recently moved to the United States. Her first language was Spanish with the ability to speak fluent English. Though retired, the subject was previously employed as a secretary for the Chilean embassy. She was referred to physical therapy for chronic lower back pain resulting from a car accident experienced several years prior. Participant Four was being considered for surgery to reduce lower back pain, but chose to attend physical therapy before deciding if surgery was necessary. Comorbid diagnoses included posttraumatic stress disorder and seasonal pattern for recurrent major depressive disorder.

## **Measures**

**Demographics Questionnaire.** The demographic questionnaire was developed by the researchers, and consisted of basic demographic information including age, race, ethnicity, height, weight, gender, marital status, occupation, and highest educational level completed (Appendix B).

**Valued-Living Questionnaire.** (VLQ; Wilson, Sandoz, Kitchens, & Roberts, 2010). The VLQ is a two-part questionnaire (20 items total) which assesses values important to participants and how consistently individuals live in accordance with those reportedly important values. This questionnaire has been shown to be useful clinically and in research settings. The measure has shown adequate internal consistency (Cronbach's  $\alpha = .74$ ) and good test-retest reliability (Cronbach's  $\alpha = .57-.79$ ; Wilson, Sandoz, Kitchens, & Roberts, 2010).

**Acceptance and Action Questionnaire – Exercise.** (AAQ-EX; Statts, 2014). The AAQ-EX is a 15-item questionnaire measuring experiential avoidance and

psychological flexibility pertaining to physical activity. Higher scores indicate higher experiential avoidance and lower psychological flexibility; therefore lower scores are desired post-treatment. This measure has shown good internal consistency (Cronbach's  $\alpha = .85-.87$ ; Statts, 2014).

**Distress Tolerance Scale.** (DTS; Simons & Gaher, 2005). The DTS is a 16-item questionnaire which measures tolerance, appraisal, absorption, and the ability to withstand negative psychological states. Higher scores indicate greater distress tolerance.

**Mindful Attention Awareness Scale.** (MAAS; Brown & Ryan, 2003). The MAAS is a 15-item questionnaire that measures participants' consciousness, self-awareness, and mindfulness in general during everyday situations. Higher scores indicate greater mindfulness. The MAAS has demonstrated good internal consistency (Cronbach's  $\alpha = .85$ ; Brown & Ryan, 2003).

**Chronic Pain Acceptance Questionnaire - 8.** (CPAQ-8; Fish, McGuire, Hogan, Morrison, & Stewart, 2010). The CPAQ-8 is an 8-item questionnaire measuring participants' activity engagement and pain willingness in regards to chronic pain. Higher scores indicated greater acceptance of chronic pain.

**Adherence Questionnaire.** The adherence questionnaire is a 7-item instrument developed by the researchers and created for this study (Appendix C). Higher scores indicate greater adherence to physical therapy sessions and home exercises.

**Outcome Questionnaire.** A 6-item measure was developed for this study to assess both the patient and physical therapist's views of patient progress and the overall outcome of treatment (Appendix D).



## **Procedure**

Before recruiting participants, this study received approval from the Missouri State Institutional Review Board (#16-0026; 8/20/2015; Appendix E). Missouri State University's physical therapy clinic in Springfield, Missouri promoted the study. New clinic patients were informed of the study by their physical therapist, and then invited to participate via the experimenter who met individually with each subject prior to committing to the study. After agreeing to participate in the study, the patient had the opportunity to discuss their concerns about the study and ask any questions they had regarding the material. They were then asked to sign the informed consent. Prior to their first physical therapy session at the clinic, each participant completed a battery of ACT specific assessments including the Valued Living Questionnaire (VLQ; Wilson, Sandoz, Kitchens, & Roberts, 2010), Acceptance and Action Questionnaire – Exercise (AAQ-EX; Staats, 2014), Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003), Distress Tolerance Scale (DTS; Simons & Gaher, 2005), and the Chronic Pain Acceptance Questionnaire-8 (CPAQ-8; Fish, McGuire, Hogan, Morrison & Stewart, 2010).

Baseline adherence was measured from three or four physical therapy sessions using the adherence questionnaire developed for the study. The patient and therapist completed their respective forms at each visit to the physical therapy clinic. Adherence was contingent upon each patient's individualized rehabilitation plan. During the early baseline phase, both patient and researcher scheduled a time and location to meet weekly for the intervention.

The ACT intervention was introduced during the week following the final baseline measurement, and continued four weeks. Each session was based upon an adapted protocol from Dahl, Wilson, Luciano, and Hayes' (2005) book *Acceptance and Commitment Therapy for Chronic Pain*. Further exercises and examples were modified from the book *Living Beyond Your Pain: Using Acceptance and Commitment Therapy to Ease Chronic Pain* by Dahl and Lundgren (2006) and the treatment protocol *Life with Chronic Pain: An Acceptance-based Approach – Therapist Guide and Patient Workbook* by Vowles and Sorrell (2007). While not all participants suffered from chronic pain, pain in general was an influential part of each participant's recovery; thus, the protocol was tailored to each patient's experience of pain in physical therapy. The guidelines for each session are as follows (Appendix F).

**Session 1.** The therapist learned about the patient's experience with pain thus far, and gained an understanding of the current situation which led to physical therapy. Therapist and patient then went over the packet completed prior to the intervention, and created a life compass from the responses on the VLQ (See Appendix G for an example of a life compass). The life compass further describes the values dimensions in the patient's life and how consistently they live according to their values. Issues such as barriers and discrepancies between values and behavior were discussed within the context of physical therapy. Next, creative hopelessness was explored with the patient. The participant was asked to evaluate their current coping strategies and methods of reducing pain or discomfort, which ties to the concept of exposure in physical therapy. The purpose of willingness to feel discomfort in order to achieve valued living was described.

Lastly, patients identified which values they wanted to focus on for the remainder of therapy and a first session summary was reviewed.

**Session 2.** The second session began with a review of the values compass done in the first session, and the patient was reminded about the intervention purpose. Cognitive defusion techniques were then explored as a means of illustrating the dangers caused by experiential avoidance as it relates to physical therapy program adherence. The patient was asked to identify common negative or difficult thoughts that occur and then become an impartial, non-judgmental observer of those thoughts. The cognitive defusion exercises relate back to valued action and a willingness to feel discomfort in order to act in ways that are consistent with those values. Finally, the patient was instructed on how to handle barriers that influence their ability to follow through with valued action (Luoma & Hayes, in press). For homework, participants were asked to make a commitment to act in a valued way at least one time throughout the week and then report their experiences in the next session.

**Session 3.** The third session began with a review of values through the use of a commonly used value clarification exercise – attend your own funeral. During this exercise, patients were asked to envision attending their own funeral and describe who they might want to have and what they would like said at their funeral. This exercise tied into further exploration of cognitive defusion techniques continuously reviewed throughout the session. For the remainder of the meeting, willingness was the main focus and participants were walked through several metaphors to explain the importance of willingness to feel discomfort in order to live according to their values, and how that tied in with their physical therapy experience. The session ended by exploring mindfulness

techniques. The goal of mindfulness was first introduced and then participants were presented with several different options to practice mindfulness. The patients were encouraged to practice at least one of these mindfulness exercises throughout the week until the next session.

**Session 4.** The final session reviewed everything that had been previously taught, paying special attention to values clarity and willingness to feel discomfort in the context of physical therapy. The session centered on the idea of acceptance and how to engage in a life with physical pain or discomfort and yet still act in ways which are consistent with the individual's values such as completing physical therapy. Lastly, participants were instructed to make a commitment to live according to their values, and specific behaviors were identified to demonstrate some of the actions that could be taken to fulfill this commitment. Patients were presented with ACT specific resources they could refer to upon wanting to continue exploring ACT concepts and treatment.

Additional sessions were offered to participants who requested further therapy or those who the experimenter felt required supplemental sessions for comprehension of ACT principles. These sessions covered no new material, however the concepts were further explained for clarification. Participants and physical therapists continued to complete the adherence questionnaire throughout treatment. At the conclusion of clinic-based physical therapy, participants were administered the same questionnaires (VLQ, AAQ-EX, MAAS, DTS, and CPAQ-8) from the beginning of the study. Additionally, patients and therapists completed the outcome questionnaire created for this study.

## RESULTS

Participants' adherence data for physical therapy sessions and home exercises were analyzed using a series of paired samples *t*-test. The last three baseline measurements were compared to the last three treatment measurements for the paired samples *t*-tests. For participants whose data could not be calculated using a paired samples *t*-test, mean scores were visually compared. The data are divided into two different categories, patient rated and therapist rated in order to address some of the issues with self-reported adherence.

An average score from the adherence questionnaire was used for the calculations of the physical therapy and home exercise adherence data for each time point. For the adherence data in physical therapy sessions, three questions were averaged to calculate the score used at each time point from the adherence questionnaire: "I (the patient) followed through with the therapist's instructions in my (the patient's) physical therapy session," "I (the patient) preformed to the best of my (the patient's) ability in the physical therapy session," and "I (the patient) was actively involved in the physical therapy session." For the adherence data in home exercises, four questions were averaged to calculate the score used at each time point from the adherence questionnaire: "I (the patient) completed the list of home exercises my (the patient's) physical therapist recommended," "I (the patient) preformed the home exercises the recommended amount of times during the past week," "I (the patient) was actively involved in the home exercises throughout the week," and "I (the patient) preformed the home exercises to the

best of my (the patient's) ability." Missing data was replaced using last observation carried forward.

Individual subject data are described and summarized in figures and tables. Graphs are provided for each subject's adherence data. The graphs include the average of the questions for physical therapy adherence or home exercise adherence for each time point. In the graphs, the three baseline measurements were averaged; hence only one data point is presented. Additionally, summary scores for each questionnaire in the battery of assessments administered pre-and post-treatment are provided in tables. The summary score for each questionnaire is visually compared to a mean score that was found from previous validation studies of the questionnaires. Lastly, each subject's outcome questionnaire data is reported in table format.

## **Participant 1**

**Physical Therapy Adherence.** There was no statistically significant difference between the participant's physical therapy adherence data from baseline to treatment from the patient's ratings,  $M_{diff} = -0.67$ ,  $SD_{diff} = 2.31$ ,  $t(2) = -0.50$ ,  $p = 0.67$ ,  $\eta^2 = 0.11$ , nor the physical therapist's ratings,  $M_{diff} = -0.67$ ,  $SD_{diff} = 2.31$ ,  $t(2) = -0.50$ ,  $p = 0.67$ ,  $\eta^2 = 0.11$ . Despite not finding statistical significance, there were non-significant improvements for physical therapy adherence from baseline to treatment and 11% of the variance can be attributed to the treatment intervention. Figures 1 and 2 below illustrates Participant One's physical therapy adherence data as averaged from the three physical therapy questions in the adherence questionnaire. Participant One's baseline data was not stable across the three time points, however, data representing the last two weeks was

consistent. Based upon information from the participant, she was initially motivated and expected quick change. When that did not happen, she was less adherent to her treatment plan. An interesting pattern consistent with what is often seen in medication adherence literature.

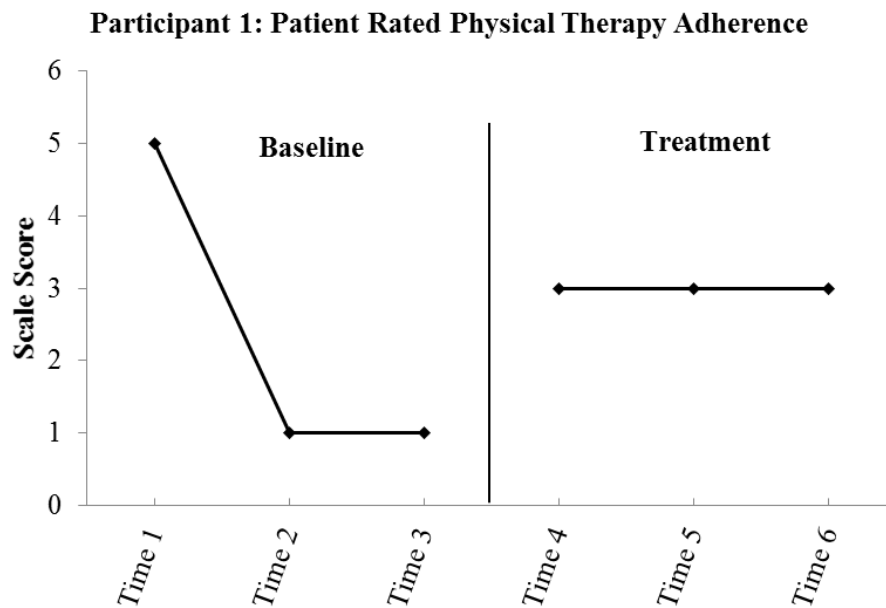


Figure 1. Patient Rated Physical Therapy Adherence for Participant 1

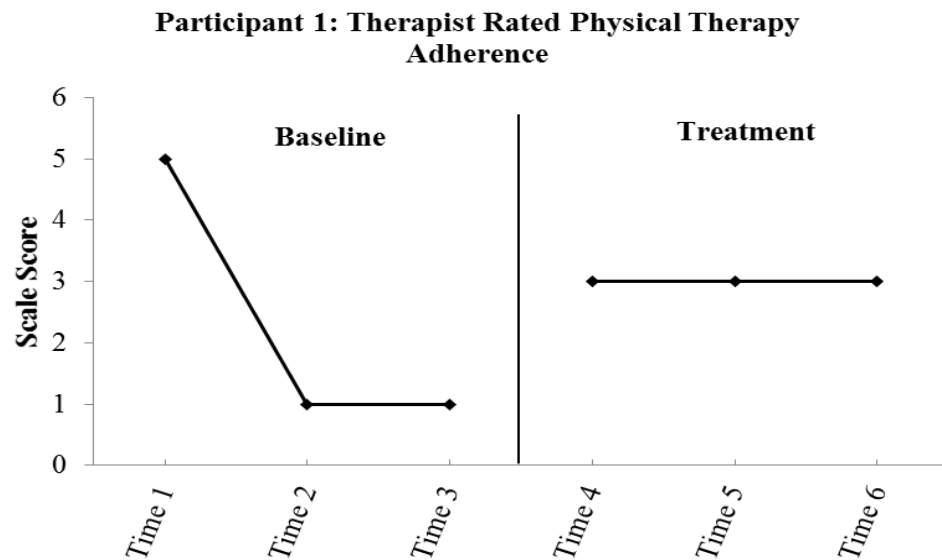


Figure 2. Therapist Rated Physical Therapy Adherence for Participant 1

**Home Exercise Adherence.** Participant One's home exercise adherence data could not be calculated because the baseline and treatment scores showed no variability, (i.e. the subject rated all baseline measurements with a score of one, and all treatment measurements with a score of five). However, there was an absolute level difference from baseline to treatment, were the patient and therapist rated the baseline home exercise adherence as a score of one and the treatment period as a score of five (a difference of four points). Figures 3 and 4 below illustrate Participant One's home exercise adherence data that was averaged from the four home exercise questions in the adherence questionnaire.

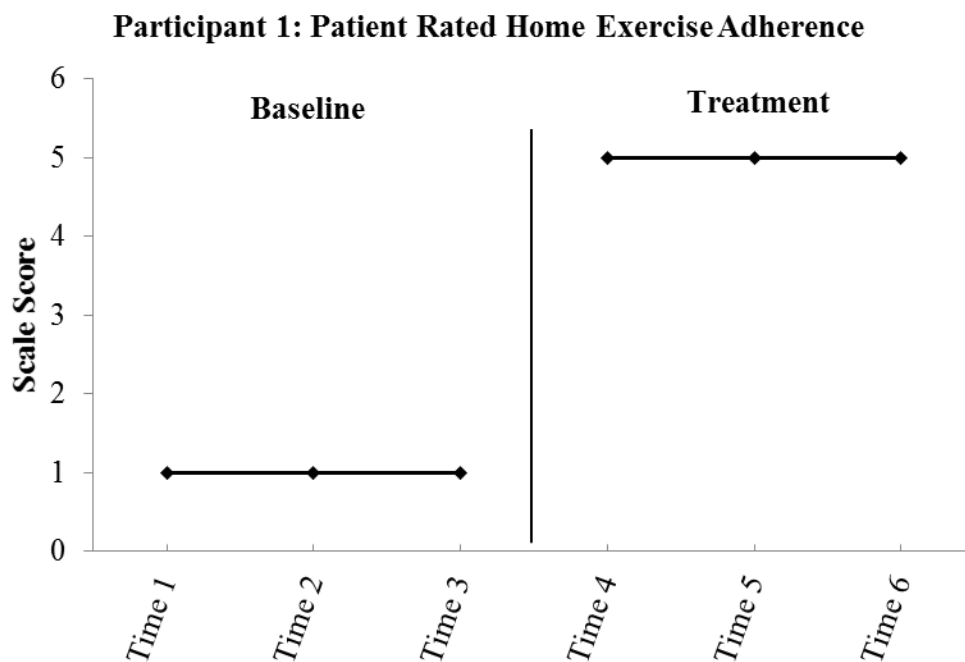


Figure 3. Patient Rated Home Exercise Adherence for Participant 1



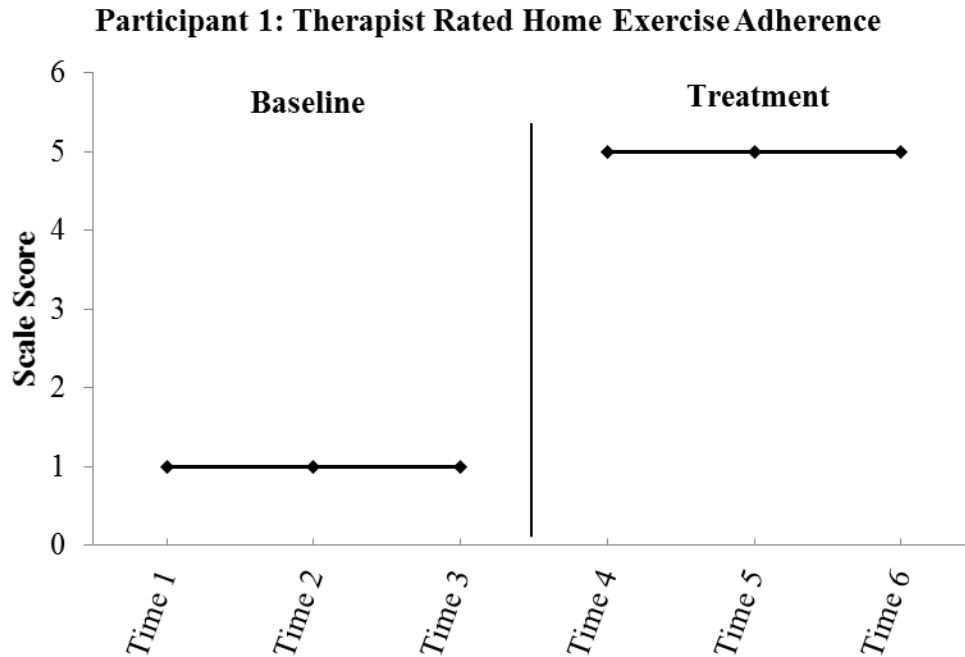


Figure 4. Therapist Rated Home Exercise Adherence for Participant 1

**Questionnaires and Outcome Data.** Additionally, Participant One showed no change from pre- to post-treatment on the VLQ. However, the baseline mean was lower than expected for the population, as reported by Wilson, Sandoz, Kitchens, and Roberts (2010). This indicates that she is highly concordant with her values, and has little room for improvement. The AAQ-EX score increased slightly from pre-to post-treatment, indicating that the participant's experiential avoidance increased. However, the DTS score increased from pre-to post-treatment indicating that the participant had greater distress tolerance after treatment. The participant's ability to be mindful slightly increased from pre- to post-treatment as shown with an increase on the MAAS. Lastly, Participant One reported greater acceptance of chronic pain on the CPAQ-8 at post-treatment compared to pre-treatment. The participant's scores are summarized below in the Table 1.

Table 1. Pre-and Post-Treatment Questionnaire Summary Scores for Participant 1

Questionnaire	Pre-Treatment	Post-Treatment	Reported Means**
VLQ	42.00	42.00	64.21 ( <i>SD</i> = 15.41)
AAQ-EX	56.00	58.00	45.43 ( <i>SD</i> = 14.20)
DTS	2.75	3.47*	3.43 ( <i>SD</i> = 0.76)
MAAS	4.20	4.23*	3.85 ( <i>SD</i> = 0.68)
CPAQ-8	23.00	24.00*	23.4 ( <i>SD</i> = 9.10)

\*Notes improvements from pre to post treatment

\*\*Reported means are from Wilson, Sandoz, Kitchens, & Roberts 2010; Staats, 2014; Simons & Gaher, 2005; Brown & Ryan, 2003; Fish, et al, 2010 respectively

Lastly, on the outcome questionnaire the participant and the therapist reported either a score of three or four as shown below in Table 2 (1 = Strongly disagree and 5 = Strongly agree).

Table 2. Outcome Questionnaire Data for Participant 1

Question	Patient Rated	Therapist Rated
1. I (the patient) improved as I (the patient) expected.	3	3
2. My (the patient's) injury is better off after completion of physical therapy.	4	4
3. The amount of pain has decreased compared to the beginning of treatment.	4	4
4. Physical therapy was worthwhile and useful for me (the patient).	4	4
5. Acceptance and Commitment Therapy (ACT) was worthwhile and useful for me.	4	N/A
6. The ACT intervention taught me something new about myself and about how to think about the world.	4	N/A

## Participant 2

**Physical Therapy Adherence.** Like Participant One, although there was no statistically significant differences between the participant's physical therapy adherence data from baseline to treatment from the patient's ratings,  $M_{diff} = -1.33$ ,  $SD_{diff} = 1.15$ ,  $t(2) = -2.00$ ,  $p = 0.18$ ,  $\eta^2 = 0.67$ , nor for the therapist's ratings,  $M_{diff} = -1.33$ ,  $SD_{diff} = 1.15$ ,  $t(2) = -2.00$ ,  $p = 0.18$ ,  $\eta^2 = 0.67$ , single-subject review demonstrates improvements for physical therapy adherence from baseline to treatment and that 67% of the variance may be attributed to the treatment intervention. As seen in Figures 5 and 6, Participant Two's baseline data was trending upwards before the intervention was introduced indicating that the intervention may not be the only reason there was a change in physical therapy adherence.

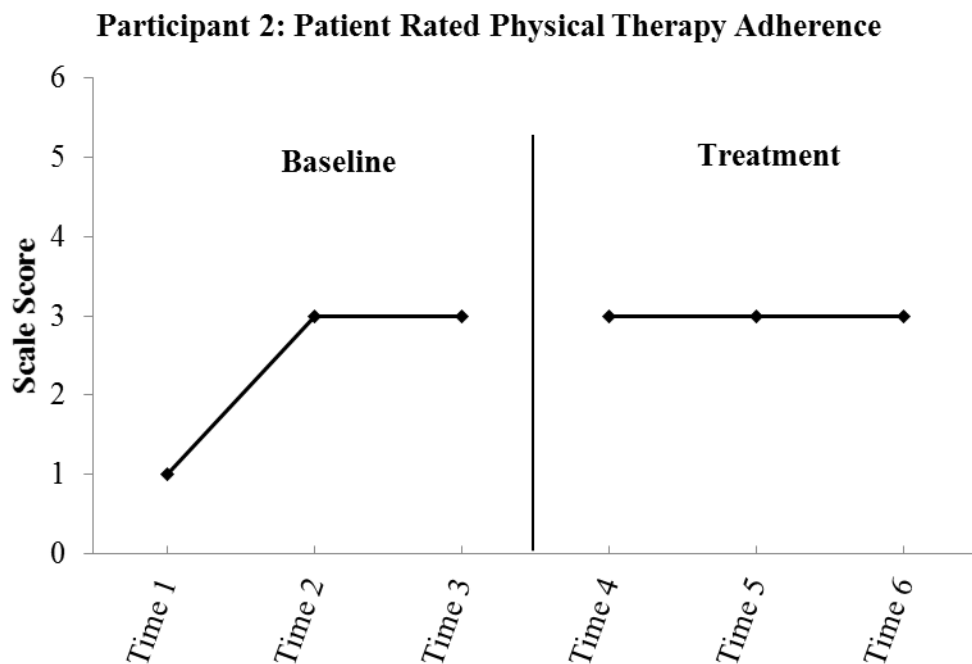


Figure 5. Patient Rated Physical Therapy Adherence for Participant 2

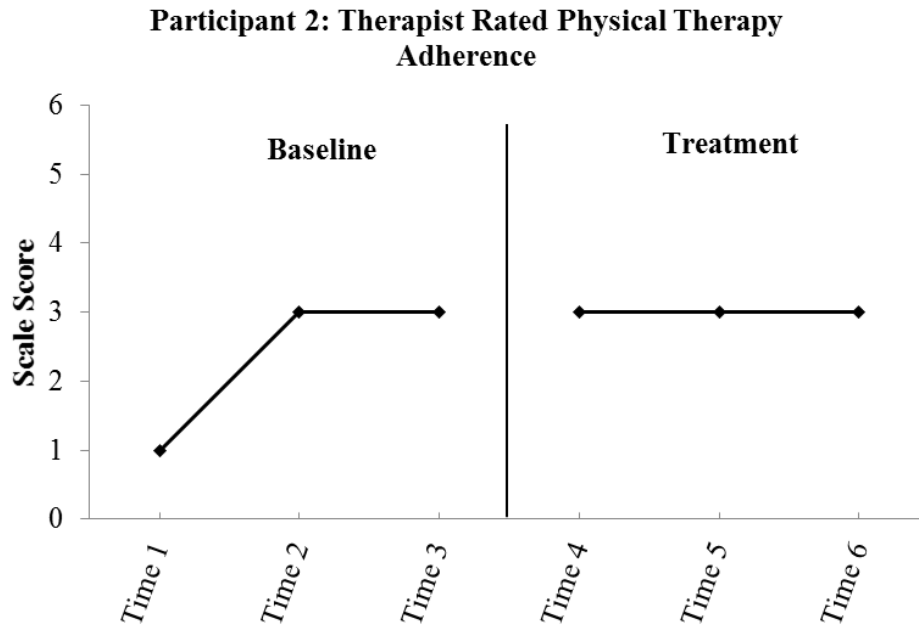


Figure 6. Therapist Rated Physical Therapy Adherence for Participant 2

**Home Exercise Adherence.** There was no statistically significant difference between Participant Two's home exercise adherence data from baseline to treatment from the patient's ratings,  $M_{diff} = -2.25$ ,  $SD_{diff} = 2.41$ ,  $t(2) = -1.62$ ,  $p = 0.25$ ,  $\eta^2 = 0.57$ , nor the physical therapist's ratings,  $M_{diff} = -2.25$ ,  $SD_{diff} = 2.41$ ,  $t(2) = -1.62$ ,  $p = 0.25$ ,  $\eta^2 = 0.57$ . However, from baseline to treatment, the participant increased her adherence to prescribed home exercises and 57% of the variance can be attributed to the intervention. The figures below demonstrate the change seen in Participant Two from baseline to treatment. As seen Figures 7 and 8, Participant Two's baseline data was not stable across the three time points, however, this may be explained by variability in the prescribed program. The spike in adherence coincided with a temporary change in treatment plan, which was much less demanding of time and effort. As such, the participant was more

adherent to home exercises during that week, as opposed to the two weeks with his standard prescribed exercises.

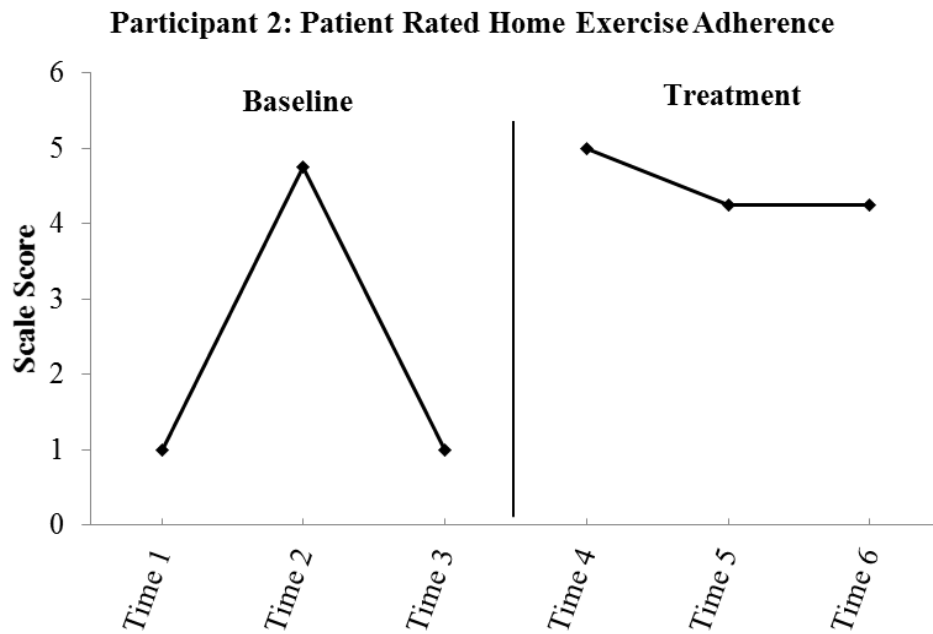


Figure 7. Patient Rated Home Exercise Adherence for Participant 2

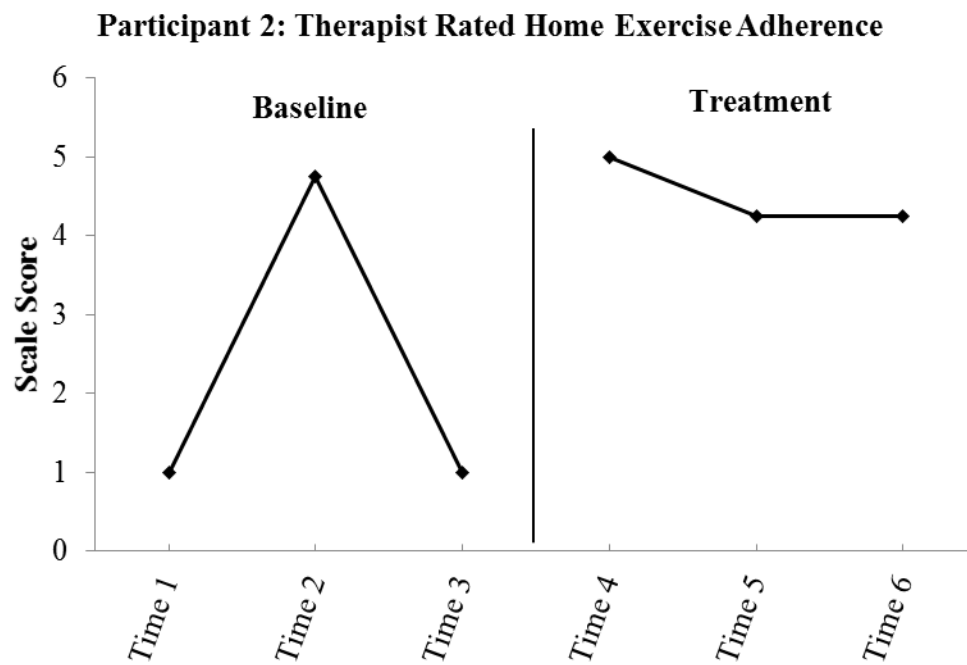


Figure 8. Therapist Rated Home Exercise Adherence for Participant 2

**Questionnaires and Outcome Data.** Additionally, Participant Two had a decrease in her VLQ score indicating that she was living more consistently with her values following the intervention. The AAQ-EX score decreased from pre-to post-treatment, indicating that the participant reported less experiential avoidance. The DTS score decreased slightly from pre-to post-treatment indicating that the participant reported less distress tolerance after treatment. However, the participant's summary score was lower than the mean score provided by Simons and Gaher (2005) demonstrating that the subject's level of distress tolerance was lower than average prior to treatment. The participant's ability to be mindful slightly decreased from pre- to post-treatment as shown with a decrease on the MAAS. Lastly, subject two reported less acceptance of chronic pain on the CPAQ-8 at post-treatment compared to pre-treatment. The participant's scores are summarized below in the Table 3.

Table 3. Pre-and Post-Treatment Questionnaire Summary Scores for Participant 2

Questionnaire	Pre-Treatment	Post-Treatment	Reported Means**
VLQ	15.00	5.00*	64.21 ( <i>SD</i> = 15.41)
AAQ-EX	53.00	44.00*	45.43 ( <i>SD</i> = 14.20)
DTS	2.13	2.06	3.43 ( <i>SD</i> = 0.76)
MAAS	4.53	3.87	3.85 ( <i>SD</i> = 0.68)
CPAQ-8	44.00	41.00	23.4 ( <i>SD</i> = 9.10)

\*Notes improvements from pre to post treatment

\*\*Reported means are from Wilson, Sandoz, Kitchens, & Roberts 2010; Staats, 2014; Simons & Gaher, 2005; Brown & Ryan, 2003; Fish, et al, 2010 respectively

The participant and the therapist reported either a score of four or five on the outcome questionnaire, which is summarized below in Table 4 (1 = Strongly disagree and 5 = Strongly agree).

Table 4. Outcome Questionnaire Data for Participant 2

Question	Patient Rated	Therapist Rated
1. I (the patient) improved as I (the patient) expected.	4	4
2. My (the patient's) injury is better off after completion of physical therapy.	5	5
3. The amount of pain has decreased compared to the beginning of treatment.	5	5
4. Physical therapy was worthwhile and useful for me (the patient).	5	5
5. Acceptance and Commitment Therapy (ACT) was worthwhile and useful for me.	5	N/A
6. The ACT intervention taught me something new about myself and about how to think about the world.	5	N/A

### Participant 3

**Physical Therapy Adherence.** The patient and the therapist reported no change of physical therapy adherence from baseline to treatment. Both the patient and the therapist rated the participant's adherence to physical therapy with a score of three throughout the entirety of the study. There was no variability in the scores for physical therapy adherence so the paired samples *t*-test could not be calculated (see figure 9 and 10).

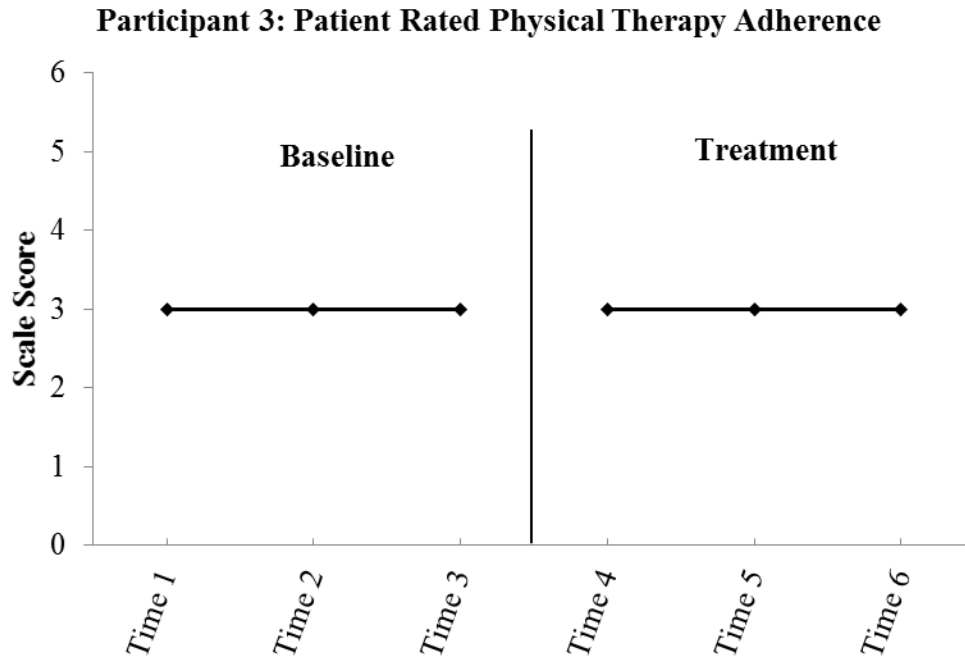


Figure 9. Patient Rated Physical Therapy Adherence for Participant 3

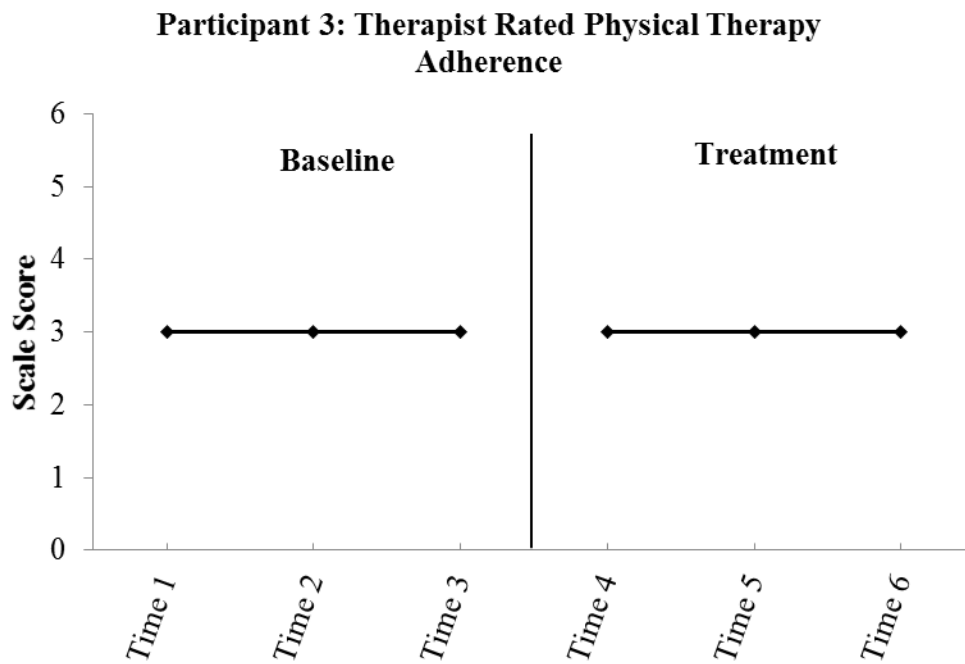


Figure 10. Therapist Rated Physical Therapy Adherence for Participant 3



**Home Exercise Adherence.** There was a significant difference between the participant's home exercise adherence data from baseline to treatment from the patient's ratings,  $M_{diff} = -0.92$ ,  $SD_{diff} = 0.29$ ,  $t(2) = -5.50$ ,  $p = 0.03$ ,  $\eta^2 = 0.94$ , and the therapist's ratings,  $M_{diff} = -0.67$ ,  $SD_{diff} = 0.14$ ,  $t(2) = -8.00$ ,  $p = 0.02$ ,  $\eta^2 = 0.97$ . The participant significantly improved in his adherence to prescribed home exercises from baseline to treatment and 94-97% of the variance can be attributed to the intervention. Figures 11 and 12 below demonstrate the change seen in Participant Three from baseline to treatment.

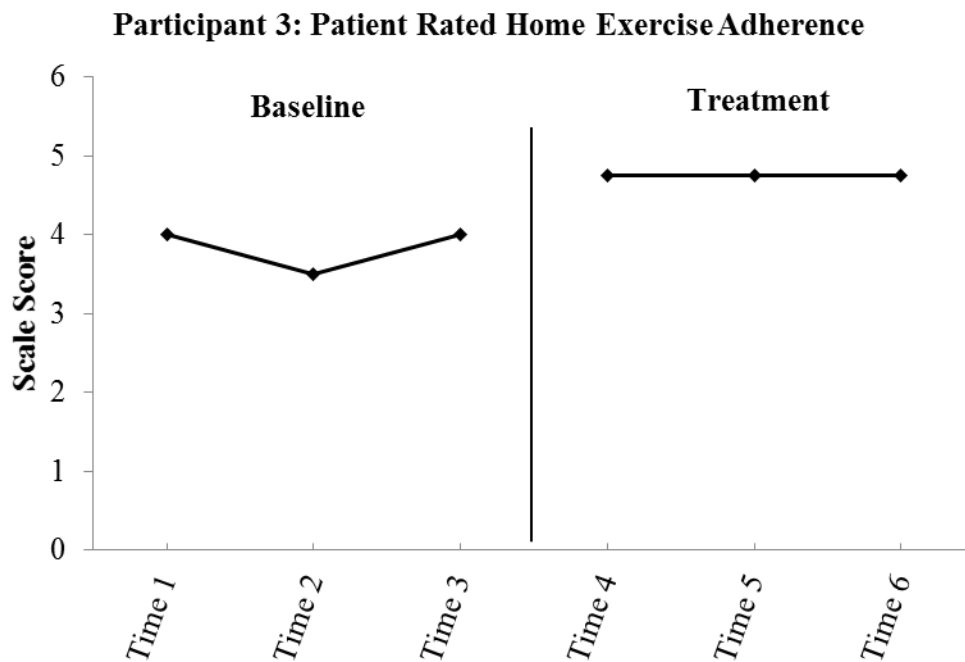


Figure 11. Patient Rated Home Exercise Adherence for Participant 3

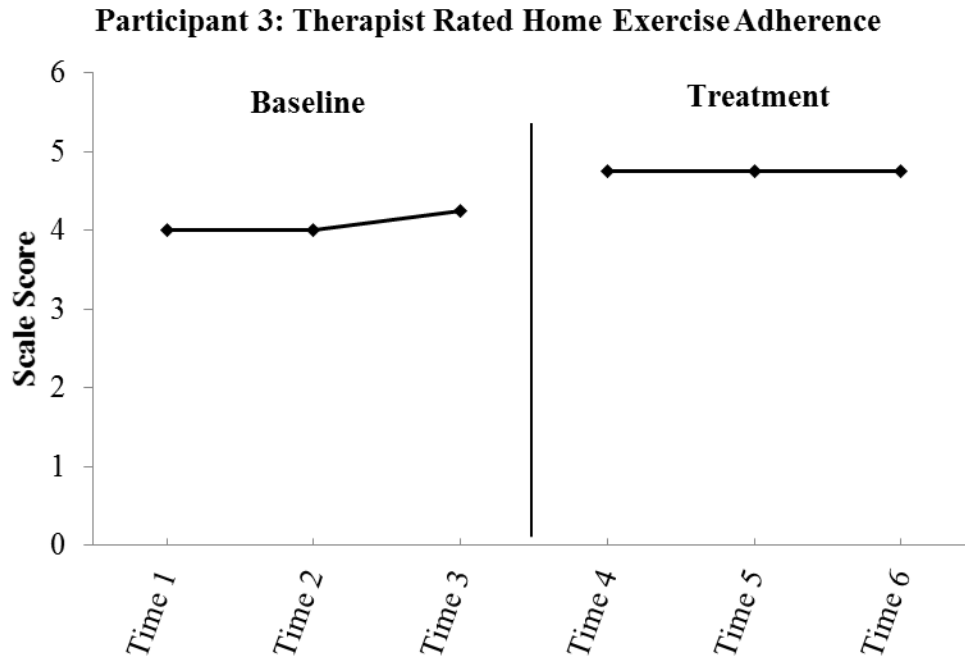


Figure 12. Therapist Rated Home Exercise Adherence for Participant 3

**Questionnaires and Outcome Data.** Additionally, Participant Three showed a decrease in his VLQ score indicating that he was living more consistently with his values. The AAQ-EX score also decreased from pre-to post-treatment, indicating that the participant reported less experiential avoidance. The DTS score decreased slightly from pre-to post-treatment indicating that the participant reported less distress tolerance after treatment. However, the participant's summary score was lower than the mean score provided by Simons and Gaher (2005) demonstrating that the subject's level of distress tolerance was lower than average prior to treatment. The participant's ability to be mindful slightly decreased from pre- to post-treatment as shown with a decrease on the MAAS. Lastly, Participant Three reported greater acceptance of chronic pain on the

CPAQ-8 at post-treatment compared to pre-treatment. The participant's scores are summarized below in the Table 5.

Table 5. Pre-and Post-Treatment Questionnaire Summary Scores for Participant 3

Questionnaire	Pre-Treatment	Post-Treatment	Reported Means**
VLQ	10.00	8.00*	64.21 ( <i>SD</i> = 15.41)
AAQ-EX	53.00	48.00*	45.43 ( <i>SD</i> = 14.20)
DTS	1.60	1.80	3.43 ( <i>SD</i> = 0.76)
MAAS	4.60	3.60	3.85 ( <i>SD</i> = 0.68)
CPAQ-8	25.00	28.00*	23.4 ( <i>SD</i> = 9.10)

\*Notes improvements from pre to post treatment

\*\*Reported means are from Wilson, Sandoz, Kitchens, & Roberts 2010; Staats, 2014; Simons & Gaher, 2005; Brown & Ryan, 2003; Fish, et al, 2010 respectively

The participant and the therapist reported either a score of four or five on the outcome questionnaire with the exception of the patient's perception of improvement with physical therapy. The therapist disagreed with the patient on this rating, indicating that the patient had improved as was expected, suggesting a lack on coherence between expectations between the patient and therapist. The outcome questionnaire is summarized below in Table 6 (1 = Strongly disagree and 5 = Strongly agree).

Table 6. Outcome Questionnaire Data for Participant 3

Question	Patient Rated	Therapist Rated
1. I (the patient) improved as I (the patient) expected.	2	4
2. My (the patient's) injury is better off after completion of physical therapy.	4	4
3. The amount of pain has decreased compared to the beginning of treatment.	4	4
4. Physical therapy was worthwhile and useful for me (the patient).	5	4
5. Acceptance and Commitment Therapy (ACT) was worthwhile and useful for me.	4	N/A
6. The ACT intervention taught me something new about myself and about how to think about the world.	4	N/A

#### Participant 4

**Physical Therapy Adherence.** There was no statistically significant difference between the participant's physical therapy adherence ratings from baseline to treatment from the patient's ratings,  $M_{diff} = -1.33$ ,  $SD_{diff} = 1.15$ ,  $t(2) = -2.00$ ,  $p = 0.18$ ,  $\eta^2 = 0.67$  nor the therapist's ratings,  $M_{diff} = -1.33$ ,  $SD_{diff} = 1.15$ ,  $t(2) = -2.00$ ,  $p = 0.18$ ,  $\eta^2 = 0.67$ . However the participant's physical therapy adherence did improve from baseline to treatment and 67% of the variance can be attributable to the intervention. As seen in Figures 13 and 14, Participant Four's baseline data was trending upwards before the intervention was introduced indicating that the intervention may not be the only reason there was a change in physical therapy adherence.

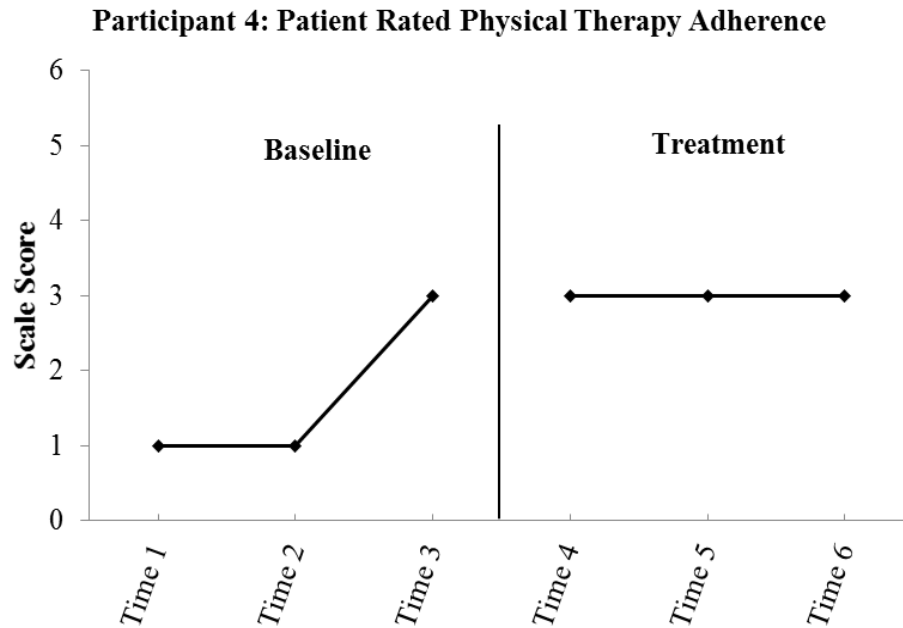


Figure 13. Patient Rated Physical Therapy Adherence for Participant 4

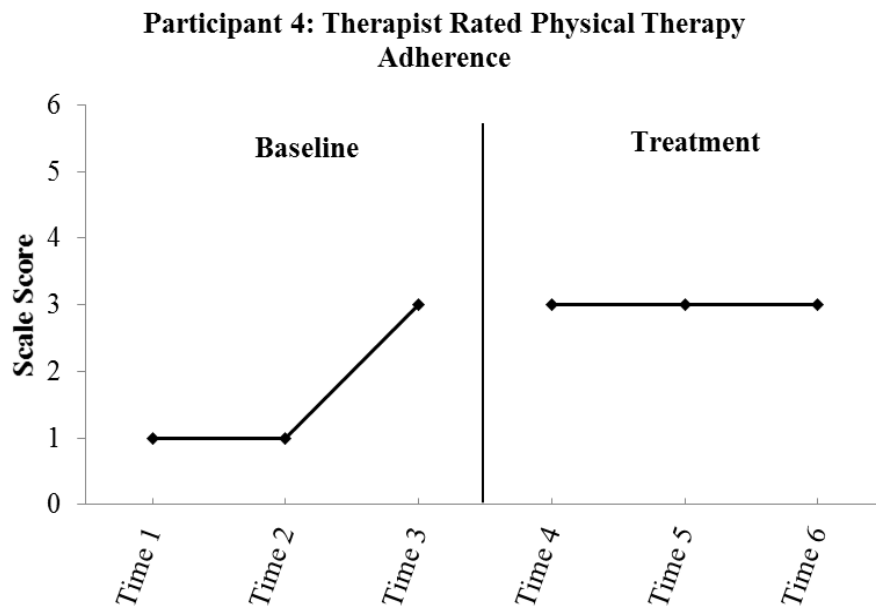


Figure 14. Therapist Rated Physical Therapy Adherence for Participant 4

**Home Exercise Adherence.** There was not a statistically significant difference between the participant's home exercise adherence data from baseline to treatment from

the patient's ratings,  $M_{diff} = -1.17$ ,  $SD_{diff} = 2.10$ ,  $t(2) = -0.96$ ,  $p = 0.44$ ,  $\eta^2 = 0.32$ , nor the therapist's ratings,  $M_{diff} = -1.42$ ,  $SD_{diff} = 1.66$ ,  $t(2) = -1.47$ ,  $p = 0.28$ ,  $\eta^2 = 0.52$ . The participant improved adherence to prescribed home exercises from baseline to treatment and 32-52% of the variance can be attributed to the intervention. Figures 15 and 16 below demonstrate the change seen in Participant Four from baseline to treatment. As seen in the graphs, Participant Four's baseline data was trending upwards before the intervention was introduced indicating that the intervention may not be the only reason there was a change in home exercise adherence.

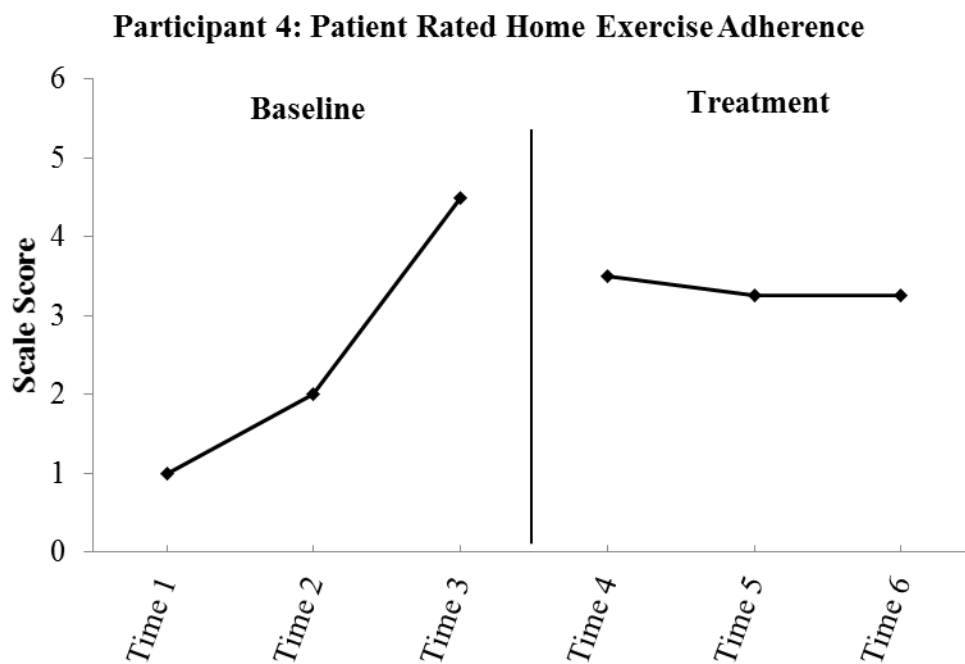


Figure 15. Patient Rated Home Exercise Adherence for Participant 4

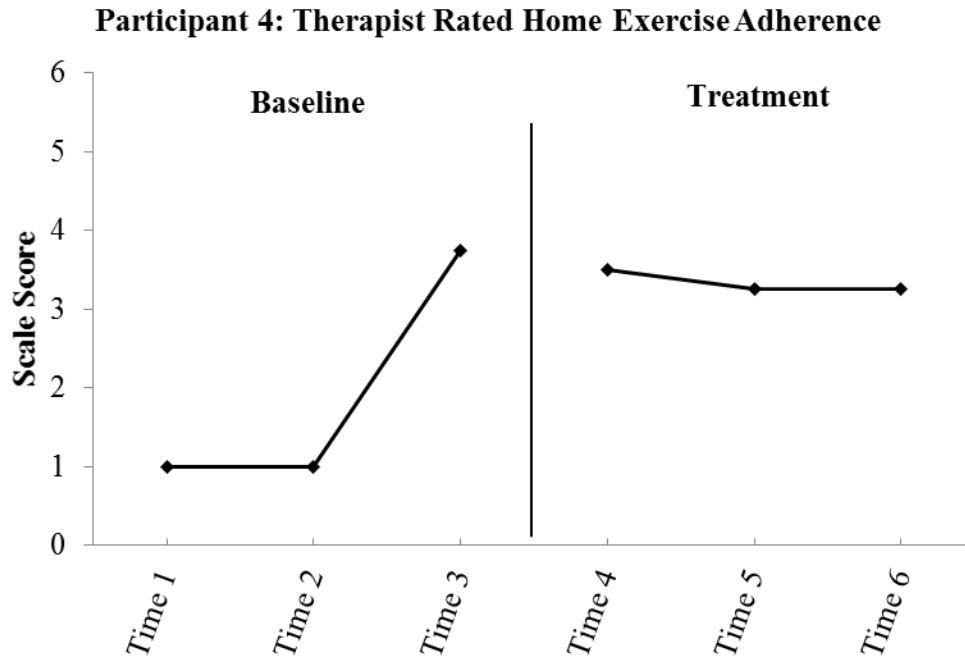


Figure 16. Therapist Rated Home Exercise Adherence for Participant 4

**Questionnaires and Outcome Data.** Additionally, Participant Four showed a decrease in her VLQ score indicating that she was living more consistently with her values. The AAQ-EX score also decreased from pre-to post-treatment, indicating that the participant reported less experiential avoidance. The DTS score increased slightly from pre-to post-treatment indicating that the participant reported greater distress tolerance after treatment. The participant's ability to be mindful slightly decreased from pre- to post-treatment as shown with a decreased on the MAAS. Lastly, Participant Four reported greater acceptance of chronic pain on the CPAQ-8 at post-treatment compared to pre-treatment. The participant's scores are summarized below in the Table 7.

Table 7. Pre-and Post-Treatment Questionnaire Summary Scores for Participant 4

Questionnaire	Pre-Treatment	Post-Treatment	Reported Means**
VLQ	7.00	1.00*	64.21 ( <i>SD</i> = 15.41)
AAQ-EX	49.00	39.00*	45.43 ( <i>SD</i> = 14.20)
DTS	1.93	2.87*	3.43 ( <i>SD</i> = 0.76)
MAAS	6.00	5.47	3.85 ( <i>SD</i> = 0.68)
CPAQ-8	32.00	40.00*	23.4 ( <i>SD</i> = 9.10)

\*Notes improvements from pre to post treatment

\*\*Reported means are from Wilson, Sandoz, Kitchens, & Roberts 2010; Staats, 2014; Simons & Gaher, 2005; Brown & Ryan, 2003; Fish, et al, 2010 respectively

Lastly, the participant and the therapist reported either a score of four or five on the outcome questionnaire, which is summarized below in Table 8 (1 = Strongly disagree and 5 = Strongly agree).

Table 8. Outcome Questionnaire Data for Participant 4

Question	Patient Rated	Therapist Rated
1. I (the patient) improved as I (the patient) expected.	4	4
2. My (the patient's) injury is better off after completion of physical therapy.	4	4
3. The amount of pain has decreased compared to the beginning of treatment.	4	4
4. Physical therapy was worthwhile and useful for me (the patient).	5	4
5. Acceptance and Commitment Therapy (ACT) was worthwhile and useful for me.	4	N/A
6. The ACT intervention taught me something new about myself and about how to think about the world.	4	N/A



## **DISCUSSION**

The results of this study are encouraging, and suggest that a brief ACT intervention may be useful in physical therapy settings to improve adherence, and thereby lead to improved physical outcomes for individuals in need. Additionally, it appears the intervention was effective due to the proposed mechanisms of the intervention, including increased psychological flexibility and valued living. Finally, social validity of the intervention appears positive, in that both patients and physical therapists reported it was helpful and worthwhile. The single subject design of the study allowed for review of each case, and inspection of the degree of impact and timing of changes. We employed statistical methods to further review our results and evaluate statistical effects.

### **Adherence to Physical Therapy Sessions**

Results from two of the four participants demonstrated improvements in adherence from baseline to treatment, shown from both patient and therapist ratings. However, when utilizing statistical procedures, these improvements were not statically significant. Issues to address in future research, particularly when group designs may be utilized, include greater sample size and measurement variability; this may shed light on our lack of statistical significance. However, from a single subject perspective, the data are quite promising. In reviewing individual data, the subject who did not show change in physical therapy adherence, did not decrease in adherence, but rather remained the same throughout baseline and treatment. This participant was adhering at a level higher than usually seen in practice, even during baseline, and held a positive view of his adherence

behavior. In Participant Three's intervention sessions, he primarily expressed goals of increasing the time spent on the home exercises, and barriers he encountered adhering to rehabilitation instructions outside of therapy sessions.

Remaining participants did show increases in adherence to therapy sessions, the intervention may be responsible for up to 67% of the change seen in adherence to physical therapy sessions.

### **Adherence to Home Exercises**

All four subjects changed their adherence to the recommended home exercises from baseline to treatment both from patient and therapist perspectives. While only one of the subjects showed statistically significant improvement in adherence to home exercises, all subjects demonstrated greater adherence or a static level of adherence from baseline to treatment. The intervention may be responsible for up to 97% of the change seen in patients' adherence to home exercises throughout the study. This is an important finding, as it is the first intervention to demonstrate such an effect. This effect is likely to have potential in positively impacting patient outcomes.

Although the results indicated greater success related to participants' home exercise adherence compared to in-session adherence, this is likely due to the already high levels of clinic adherence observed in our participants. The study population, while diverse, came from an academic physical therapy clinic and all of the participants were highly educated. Education level is positively associated with health behavior outcomes and health seeking behaviors, indicating that the more education someone has, the more likely they are to engage in healthy behaviors and seek medical advice (Cutler & Lleras-

Muney, 2006; Karter et al., 2007). Therefore, the participants may have been accustomed to seeking medical help for their injuries and possibly had a pattern of attending and participating in medical appointments. In the future, it will be important to evaluate the intervention in more general physical therapy settings, with greater socio-economic and educational diversity in the sample.

Overall, these findings suggest that a brief ACT intervention can improve adherence in physical therapy rehabilitation, both with in-session attendance and home programs. While there were only four subjects in the study, each of those participants showed signs of improvement in adherence following the introduction of the ACT intervention. These results should be viewed as the beginning of the evidence needed to demonstrate that non-adherence to physical therapy can be targeted with psychological interventions such as ACT.

### **Questionnaire Data**

It was expected that all participants would show improvements in valued living, psychological flexibility, distress tolerance, mindfulness, and acceptance of chronic pain. The results indicated that three of four participants showed improvements on the Valued Living Questionnaire (VLQ; Wilson, Sandoz, Kitchens, & Roberts, 2010) suggesting that they were living more in accordance to their values after the ACT intervention. Similar results were found for the Acceptance and Action Questionnaire – Exercise (AAQ-EX; Statts, 2014) indicating that participants increased their level of self-reported psychological flexibility specifically related to exercise post-treatment. Improvements in scores on these two questionnaires demonstrate that the ACT intervention was

accomplishing some of its main goals of increasing valued-living and psychological flexibility.

Participants' scores on the remaining questionnaires which measured distress tolerance (DTS, Simons & Gaher, 2005), mindfulness (MAAS, Brown & Ryan, 2003), and acceptance of chronic pain (CPAQ-8; Fish, McGuire, Hogan, Morrison & Stewart, 2010) had varying results. For each of these measures, the participants' pre-treatment scores were lower than that reported in control samples. It is possible that the participants in this study already had high levels of distress tolerance, mindfulness, and acceptance of chronic pain, producing a ceiling effect, such that little improvement was likely or detectable. Future ACT interventions in the physical therapy setting with more diverse samples may not encounter this issue, and may be better able to detect effects. It could also be beneficial to modify the intervention by spending more time teaching mindfulness and allowing the participants time to practice these skills from the beginning of treatment. In the protocol for this study, mindfulness was not introduced until the third session so future studies could incorporate mindfulness earlier on in treatment to potentially increase the impact of this skill.

As noted earlier, participants in this study were highly satisfied with the ACT intervention. All of the participants rated the usefulness of the ACT intervention high, indicated that the intervention taught them something new, and reported that it influenced their current thinking. The physical therapist also rated the intervention positively, and indicated that he would be interested in continued use of the protocol.

Each subject showed improvements throughout this study in different areas highlighting the uniqueness of the sample. There were several comorbid conditions of the

participants and each patient had varying reasons for attending physical therapy. This increases the generalizability of the results, although this was limited by education and socio-economic status. The intervention was easily adaptable to each individual, further making this type of treatment desirable in physical therapy rehabilitation and high in external validity and generalizability. Likewise, this study is a good example of the versatility of ACT and the efficacy of a brief psychological intervention on impacting health behavior change in a physical therapy setting.

This study provides further evidence of the efficacy of ACT interventions in a health psychology setting. Particularly, ACT can be used in an integrated setting which allows patients to be treated holistically, this could ultimately improve patient outcome for mental and physical health. These findings are consistent with the current literature supporting ACT as an effective intervention for health behavior change (Forman & Butryn, 2015; McCracken, Sato, & Taylor, 2013; Hesser et al., 2012).

## **Limitations**

While the main hypothesis of this study was partially supported, there are limitations to consider when interpreting the results. Limitations include sample population and size, adherence measure issues, and lack of control for injury or comorbid diagnoses; these suggest that caution needs to be taken when analyzing the results.

**Baseline-to-Intervention Design.** There are several limitations to utilizing a baseline-to-intervention design. Baseline-to-intervention designs have internal consistency issues that limit the conclusions drawn from the data. There are several other confounding variables that could explain the change seen in participants from baseline to

treatment, so it is unclear if the intervention was the main mechanism for change in this study. For example, only one therapist preformed the ACT intervention, therefore, one might not rule out an effect of the therapist. However, a written protocol was followed in attempt to minimize this effect. In the future, it will be important to conduct studies to address this possibility.

A significant weakness to the study is the lack of clear, stable baselines for all participants and all measures. Due to time constraints of therapy protocol, this was difficult to achieve. Future studies would benefit from having the opportunity to collect additional baseline data until stability is achieved. This may require limiting participants to those with a predetermined injury and rehabilitation program of extended time. Though this design does not allow for conclusions, it does provide information suggestive of the need for future, larger scale, work with increased resources. Such research would provide more conclusive data regarding the role of this intervention in increasing physical therapy adherence.

**Sample Size and Population.** Even though this study utilized a single subject design, a larger sample size will serve to further exemplify the effectiveness of ACT interventions in the physical therapy setting. While there were several individuals entering physical therapy during the data collection stage, many prospective participants may choose not to complete the study because of the time commitment required of the intervention. Future studies may consider addressing this issue by providing the intervention through different modalities, such as in a group format or online (Buhrman et al., 2013; Trompetter, Bohlmeijer, Veehof, & Schreurs, 2015). This may increase participation by reducing the time required and other barriers.

As previously noted, there may have also been a limitation with the sample population utilized in this study. All participants in this study were categorized as middle to high socioeconomic status (SES), so no lower SES individuals were represented. Research suggests that the lower SES population needs the most resources when improving health behavior change, (Conner et al., 2013). Future researchers should attempt to include these individuals in the sample population to evaluate if an ACT intervention for physical therapy adherence may be appropriate for this population as well.

**Adherence Measure.** The adherence measure used was created specifically for this study in order to understand how adherence was impacted both for physical therapy sessions and home exercises. The current measures of adherence in the physical therapy field are generally injury specific and do not allow for a general grasp of adherence to physical therapy sessions or prescribed home exercises. Future studies may consider using alternative measures, such as the Sport Injury Rehabilitation Adherence Scale (SIRAS), which is a three-item assessment of adherence for rehabilitation for musculoskeletal injuries. This is a valid and reliable measure, however the questionnaire does not specifically inquire about home exercises and is only completed by the physical therapist (Kolt et al., 2007). It was important to differentiate how the patient was adhering to the physical therapy sessions and home exercises separate from each other while gaining both patient and therapist perspectives. The SIRAS does not allow for that differentiation and does not gain the patient's perspective of adherence.

The patients' ratings of adherence were self-reported in this study, which can also have implications. With self-report measures, there is the risk of social desirability that

could influence an individual's response on a questionnaire (Brenner & DeLamater, 2014). For the home exercise adherence measure in the study, there is the possibility that participants may not remember how often they actually followed through with these activities. This would impact the validity of information obtained. While there are limitations to self-report measures, this study attempted to correct for this problem by gaining both the patient and therapist ratings of adherence throughout the study. The patient's and therapist's ratings of both physical therapy and home exercise adherence were agreeable, with only a few differences observed throughout the data collection. This suggests that the questionnaire in the study was capturing a good picture of the patient's adherence to both physical therapy and home exercises because of the compatibility between the patient and therapist's ratings.

Floor and ceiling effects are another potential issue with the adherence questionnaire used in this study. Because the scale only had a five-point Likert rating, participants' score tended to group either at the bottom or top of this measure. This limited the ability to detect changes in reported behavior, particularly in an already highly adherent sample. A larger, more diverse sample may not experience this limitation to such degree.

**Lack of Control of Injury Type and Comorbid Diagnoses.** This study did not control for specific injuries or comorbid conditions. Because this study was viewed as preliminary, it was more important to cast a wide net and understand the general impact the intervention could have on patients in physical therapy. However, because each participant had a different reason for attending physical therapy, each patient's rehabilitation plan varied. Each patient had varying levels of physical therapy



recommendations where one patient could have three home exercises to perform throughout the week while another might only have one.

Two of the four participants had relevant, comorbid psychological conditions that impacted the intervention. Future studies should attempt to control for injury type and comorbid conditions in order to demonstrate the effectiveness of ACT for specific presentations seen in physical therapy. This will help determine which injuries seen in rehabilitation are most impacted by a brief ACT intervention and give valuable information about the scope of ACT in this setting.

### **Future Directions**

Future studies should look at the longevity of the ACT intervention by completing follow up assessments after physical therapy has ended. It would be interesting to understand the long-term effect of ACT in helping individuals maintain home exercise adherence beyond the physical therapy program. Many injuries seen in physical therapy have a risk of re-injury because individuals do not continue with recommended exercises and precautions prescribed by their physical therapist (Dunn, et al, 2004). Longitudinal studies can be done to answer these questions and would help clarify the ability of ACT to impact the long-term health of individuals who require physical therapy.

There is now supporting evidence that ACT interventions can be utilized in physical therapy settings and a brief psychological intervention can impact adherence to physical therapy. Clinicians and physical therapists alike can benefit from this information to incorporate a more integrated and holistic approach to treating difficult medial problems. This study suggests that more research needs to be done to look at the

impact of ACT on physical therapy adherence with specific populations and to understand the long-term influence of this intervention on health behavior change.

## REFERENCES

- Arch, J. J., Wolitzky-Taylor, K. B., Eifert, G. H., & Craske, M. G. (2012). Longitudinal treatment mediation of traditional cognitive behavioral therapy and acceptance and commitment therapy for anxiety disorders. *Behaviour Research and Therapy*, 50(7), 469-478.
- A-Tjak, J. L., Davis, M. L., Morina, N., Powers, M. B., Smits, J. J., & Emmelkamp, P. G. (2015). A meta-analysis of the efficacy of acceptance and commitment therapy for clinically relevant mental and physical health problems. *Psychotherapy And Psychosomatics*, 84(1), 30-36. doi:10.1159/000365764
- Blackledge, J. T. (2003). An introduction to relational frame theory: Basics and applications. *The Behavior Analyst Today*, 3(4), 421.
- Brenner, P. S., & DeLamater, J. D. (2014). Social desirability bias in self-reports of physical activity: is an exercise identity the culprit?. *Social Indicators Research*, 117(2), 489-504.
- Brewer, B. W., Cornelius, A. E., Van Raalte, J. L., Brickner, J. C., Sklar, J. H., Corsetti, J. R., Pohlman, M. H, Ditmar, T. D., & Emery, K. (2004). Rehabilitation adherence and anterior cruciate ligament reconstruction outcome. *Psychology, Health & Medicine*, 9(2), 163-175.
- Brewer, B. W., Cornelius, A. E., Van Raalte, J. L., Tennen, H., & Armeli, S. (2013). Predictors of adherence to home rehabilitation exercises following anterior cruciate ligament reconstruction. *Rehabilitation Psychology*, 58(1), 64-72. doi:10.1037/a0031297
- Brown, K. W. & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84, 822-848.
- Buhrman, M., Skoglund, A., Husell, J., Bergström, K., Gordh, T., Hursti, T., Bergstrom, T. G., Hursti, T., Bendelin, N., Furmark, T., & Andersson, G. (2013). Guided internet-delivered acceptance and commitment therapy for chronic pain patients: A randomized controlled trial. *Behaviour research and therapy*, 51(6), 307-315.
- Butryn, M. L., Forman, E., Hoffman, K., Shaw, J., & Juarascio, A. (2011). A pilot study of acceptance and commitment therapy for promotion of physical activity. *Journal of Physical Activity and Health*, 8, 516-522.

- Chase, J. A., Houmanfar, R., Hayes, S. C., Ward, T. A., Vilardaga, J. P., & Follette, V. (2013). Values are not just goals: Online ACT-based values training adds to goal setting in improving undergraduate college student performance. *Journal of Contextual Behavioral Science*, 2(3), 79-84.
- Conner, M., McEachan, R., Jackson, C., McMillan, B., Woolridge, M., & Lawton, R. (2013). Moderating effect of socioeconomic status on the relationship between health cognitions and behaviors. *Annals of Behavioral Medicine*, 46(1), 19-30.
- Coppack, R. J., Kristensen, J., & Karageorghis, C. I. (2012). Use of a goal setting intervention to increase adherence to low back pain rehabilitation: a randomized controlled trial. *Clinical rehabilitation*, 26, 1032–1042.
- Cutler, D. M., & Lleras-Muney, A. (2006). *Education and health: evaluating theories and evidence* (No. w12352). National Bureau of Economic Research.
- Dahl, J. & Lundgren, T. (2006). *Living beyond your pain: Using acceptance and commitment therapy to ease chronic pain*. Oakland, CA: New Harbinger Publications, Inc.
- Dahl, J. C., Wilson, K. G., Luciano, C., & Hayes, S. C. (2005) *Acceptance and commitment therapy for chronic pain*. Oakland, CA: Context Press
- Dunn, W. R., Lyman, S., Lincoln, A. E., Amoroso, P. J., Wickiewicz, T., & Marx, R. G. (2004). The effect of anterior cruciate ligament reconstruction on the risk of knee reinjury. *The American journal of sports medicine*, 32(8), 1906-1914.
- Fish, R. A., McGuire, B., Hogan, M., Morrison, T. G., & Stewart, I. (2010). Validation of the chronic pain acceptance questionnaire (CPAQ) in an internet sample and development and preliminary validation of the CPAQ-8. *Pain*, 149, 435-443.
- Forkan, R., Pumper, B., Smyth, N., Wirkkala, H., Ciol, M. A., & Shumway-Cook, A. (2014). Exercise adherence following physical therapy intervention in older adults with impaired balance. *Physical Therapy*, 86, 401-410.
- Forman, E. M., & Butryn, M. L. (2015). A new look at the science of weight control: How acceptance and commitment strategies can address the challenge of self-regulation. *Appetite*, 84, 171-180.
- Forman, E. M., Herbert, J. D., Moitra, E., Yeomans, P. D., & Geller, P. A. (2007). A randomized controlled effectiveness trial of acceptance and commitment therapy and cognitive therapy for anxiety and depression. *Behavior modification*, 31(6), 772-799.

- Friedrich, M., Gittler, G. Halberstadt, Y., Cermak, T., & Heiller, I. (1998). Combined exercise and motivation program: Effect on the compliance and level of disability of patients with chronic low back pain: A randomized controlled trial. *American Congress of Rehabilitation Medicine and the American Academy of Physical Medicine and Rehabilitation*, 79, 475-487.
- Granquist, M. D., & Brewer, B. W. (2013). Psychological aspects of rehabilitation adherence. *Psychology of Sport Injury and Rehabilitation*. Abingdon, UK: Routledge, 40-53.
- Gundy, J. M., Woidneck, M. R., Pratt, K. M., Christian, A. W., & Twohig, M. P. (2015). Acceptance and commitment therapy: State of evidence in the field of health psychology. *The Science Review of Mental Health Practice*, 8(2), 23-35.
- Harris, R. (2006). Embracing your demons: an overview of acceptance and commitment therapy. *Psychotherapy in Australia*, 12(4), 1-8.
- Harris, R. (2013). *Acceptance and commitment therapy training*. Retrieved from [http://www.actmindfully.com.au/acceptance\\_&\\_commitment\\_therapy](http://www.actmindfully.com.au/acceptance_&_commitment_therapy)
- Hayes, S. C. (2014). About ACT: Psychological inflexibility – an ACT view of suffering. *Association for Contextual Behavioral Science*, Retrieved from [https://contextualscience.org/about\\_act](https://contextualscience.org/about_act)
- Hayes, S. C. & Smith, S. (2005). *Get out of your mind and into your life: The new acceptance and commitment therapy*. Oakland, CA: New Harbinger Publications, Inc.
- Hayes, S. C., & Wilson, K. G. (1994). Acceptance and commitment therapy: Altering the verbal support for experiential avoidance. *The Behavior Analyst*, 17(2), 289.
- Hayes, S. C., Levin, M. E., Plumb-Villardaga, J., Villatte, J. L., & Pistorello, J. (2013). Acceptance and commitment therapy and contextual behavioral science: Examining the progress of a distinctive model of behavioral and cognitive therapy. *Behavior Therapy*, 44(2), 180-198. doi:10.1016/j.beth.2009.08.002
- Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of consulting and clinical psychology*, 64(6), 1152.
- Hesser, H., Gustafsson, T., Lundén, C., Henrikson, O., Fattahi, K., Johnsson, E., Westin, Z. V., Carlbring, P., Maki-Torkko, E., Kaldo, V., & Andersson, G. (2012). A randomized controlled trial of Internet-delivered cognitive behavior therapy and acceptance and commitment therapy in the treatment of tinnitus. *Journal of Consulting and Clinical Psychology*, 80(4), 649.

- Hubbard, I. J., Harris, D., Kilkenny, M. F., Faux, S. G., Pollack, M. R., & Cadilhac, D. A. (2012). Adherence to clinical guidelines improves patient outcomes in Australian audit of stroke rehabilitation practice. *Archives of physical medicine and rehabilitation*, 93(6), 965-971.
- Karter, A. J., Stevens, M. R., Brown, A. F., Duru, O. K., Gregg, E. W., Gary, T. L., Beckles, G. L., Tseng, C., Marrero, D. G., Waitzfelder, B., Herman, W. H., Piette, J. D., Safford, M. M., & Ettner, S. L. (2007). Educational disparities in health behaviors among patients with diabetes: the Translating Research Into Action for Diabetes (TRIAD) Study. *BMC Public Health*, 7(1), 1.
- Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical psychology review*, 30(7), 865-878.
- Kolt, G. S., Brewer, B. W., Pizzari, T., Schoo, A. M., & Garrett, N. (2007). The Sport Injury Rehabilitation Adherence Scale: a reliable scale for use in clinical physiotherapy. *Physiotherapy*, 93(1), 17-22.
- Koren, M. E. (2015, November). *Mindfulness Interventions for Nursing Students*. In 43<sup>rd</sup> Biennial Convention (07 November-11 November 2015). STTI.
- Landy, L. N., Schneider, R. L., & Arch, J. (2015). Acceptance and Commitment Therapy for the treatment of anxiety disorders: A concise review. *Current Opinion in Psychology*, 2, 70-74.
- Lee, E. B., An, W., Levin, M. E., & Twohig, M. P. (2015). An initial meta-analysis of acceptance and commitment therapy for treating substance use disorders. *Drug and alcohol dependence*, 155, 1-7.
- Ledley, G. S., Goodwin, C. L., Forman, E. M., Herbert, J. D., & Butryn, M. L. (2012). A pilot study examining the initial effectiveness of a brief acceptance-based behavior therapy for modifying diet and physical activity among cardiac patients. *Behavior Modification*, 36(2), 199-217.
- Losada, A., Márquez-González, M., Romero-Moreno, R., Mausbach, B. T., López, J., Fernández-Fernández, V., & Nogales-González, C. (2015). Cognitive-behavioral therapy (CBT) versus acceptance and commitment therapy (ACT) for dementia family caregivers with significant depressive symptoms: Results of a randomized clinical trial. *Journal of consulting and clinical psychology*, 83(4), 760.
- Luoma, J. & Hayes, S. C. (in press). Cognitive defusion. In W. T. O'Donohue, J. E. Fisher, & S. C. Hayes (Eds.), *Empirically supported techniques of cognitive behavior therapy: A step by step guide for clinicians*. New York: Wiley.

- Mahoney, J. & Hanrahan, S. J. (2011). A brief educational intervention using acceptance and commitment therapy: Four injured athletes' experiences. *Journal of Clinical Sport Psychology*, 5, 252-273.
- Mazières, B., Thevenon, A., Coudeyre, E., Chevalier, X., Revel, M., & Rannou, F. (2008). Adherence to, and results of, physical therapy programs in patients with hip or knee osteoarthritis. Development of French clinical practice guidelines. *Joint Bone Spine*, 75(5), 589-596.
- McCracken, L. M. & Jones, R. (2012). Treatment for chronic pain for adults in the seventh and eighth decades of life: A preliminary study of acceptance and commitment therapy (ACT). *Pain Medicine*, 13, 861-867.
- McCracken, L. M. & Gutierrez-Martinez, O. (2011). Processes of change in psychological flexibility in an interdisciplinary group-based treatment for chronic pain based on acceptance and commitment therapy. *Behavior Research and Therapy*, 49, 267-274.
- McCracken, L. M., Sato, A., & Taylor, G. J. (2013). A trial of a brief group-based form of acceptance and commitment therapy (ACT) for chronic pain in general practice: pilot outcome and process results. *The Journal of Pain*, 14(11), 1398-1406.
- McCracken, L. M. & Vowles, K. E. (2014). Acceptance and commitment therapy and mindfulness for chronic pain: model, process, and progress. *American Psychologist*, 69(2), 178.
- Millsagle, D. (2016). *Compliance to rehabilitation: the patient and physical therapy* [PowerPoint Presentation]. Retrieved from <http://www.d.umn.edu/~dmillsa/documents/PTpresentationf09.pdf>
- Moffitt, R. & Mohr, P. (2014). The efficacy of a self-managed acceptance and commitment therapy intervention dvd for physical activity initiation. *British Journal of Health Psychology*, 1-15.
- Najvani, B. D., Neshatdoost, H. T., Abedi, M. R., & Mokarian, F. (2015). The effect of acceptance and commitment therapy on depression and psychological flexibility in women with breast cancer. *Zahedan Journal of Research in Medical Sciences*, 17(4).
- Pisters, M. F., Veenhof, C., Schellevis, F. G., Twisk, J. W. R., Dekker, J., & Bakker, D. H. (2010). Exercise adherence improving long-term patient outcome in patients with osteoarthritis of the hip and/or knee. *Arthritis Care & Research*, 62, 1087-1094.

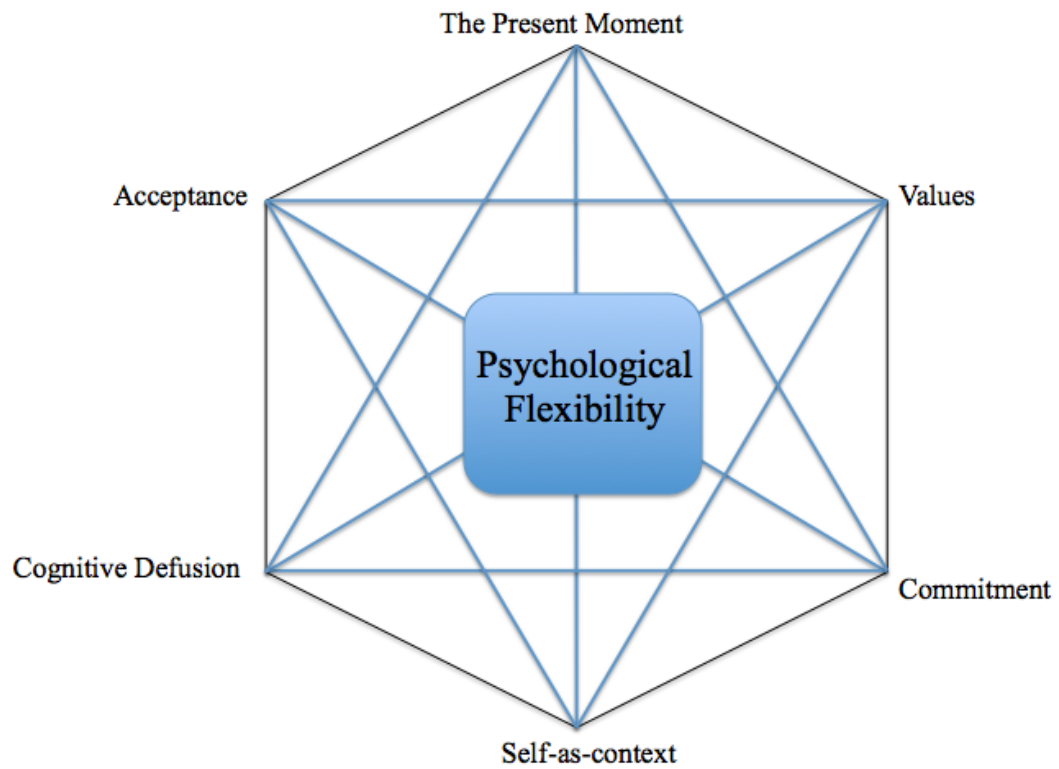
- Powers, M. B., Zum Vörde Sive Vörding, M. B., & Emmelkamp, P. M. (2009). Acceptance and commitment therapy: A meta-analytic review. *Psychotherapy and psychosomatics*, 78(2), 73-80.
- Schenck, L. (2015). "Leaf on a stream" – Cognitive defusion exercise. Retrieved from <http://www.mindfulnessmuse.com/acceptance-and-commitment-therapy/leaves-on-a-stream-cognitive-defusion-exercise>
- Simons, J. S. & Gaher, R. M. (2005). The distress tolerance scale: Development and validation of a self-report measure. *Motivation and Emotion*, 29, 83-101.
- Siqueira, V. R., & Oades, L. G. (2003). Experiential avoidance and psychological acceptance processes in the psychological recovery from enduring mental illness. *The International Journal of Psychosocial Rehabilitation*, 18(1), 105-114.
- Sluijs, E. M., Kok, G. J., & Van Der Zee, J. (1993). Correlated of exercise compliance in physical therapy. *Physical Therapy*, 73, 771-792.
- Stats, S. B. (2014). Development and validation of the acceptance and action questionnaire for exercise. Retrieved from the *Association for Contextual Behavioral Science*.
- Thompson, B. L., Luoma, J. B., & LeJeune, J. T. (2013). Using Acceptance and Commitment Therapy to guide exposure-based interventions for posttraumatic stress disorder. *Journal of Contemporary Psychotherapy*, 43(3), 133-140.
- Trompetter, H. R., Bohlmeijer, E. T., Veehof, M. M., & Schreurs, K. M. (2015). Internet-based guided self-help intervention for chronic pain based on Acceptance and Commitment Therapy: A randomized controlled trial. *Journal of behavioral medicine*, 38(1), 66-80.
- Twohig, M. P., Vilardaga, J. C. P., Levin, M. E., & Hayes, S. C. (2015). Changes in psychological flexibility during acceptance and commitment therapy for obsessive compulsive disorder. *Journal of Contextual Behavioral Science*, 4(3), 196-202.
- Vowles, K., & Sorrell, J. (2007). Life with chronic pain: An acceptance-based approach (therapist guide and patient workbook). *Bath: University of Bath*.
- Weineland, S., Arvidsson, D., Kakoulidis, T. P., & Dahl, J. (2012). Acceptance and commitment therapy for bariatric surgery patients, a pilot RCT. *Obesity Research & Clinical Practice*, 6(1), e21-e30.
- Wetherell, J. L., Afari, N., Rutledge, T., Sorrell, J. T., Stoddard, J. A., Petkus, A. J., Solomon, B. C., Lehman, D. H., Liu, L., Lang, A. J., Atkinson, J. H. (2011). A randomized, controlled trial of acceptance and commitment therapy and cognitive-behavioral therapy for chronic pain. *Pain*, 152(9), 2098-2107.



- Wilson, K. G., & Murrell, A. R. (2004). Values work in acceptance and commitment therapy. *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition*. New York: Guilford, 120-151.
- Wilson, K. W., Sandoz, E. K., Kitchens, J. & Roberts, M (2010). The valued living questionnaire: Defining and measuring valued action within a behavioral framework. *The Psychological Record*, 60, 4.

## APPENDICES

### Appendix A. Acceptance and Commitment Therapy Hexaflex



## Appendix B. Demographics Questionnaire

Study ID Number: \_\_\_\_\_

Age (in years): \_\_\_\_\_

Height (in inches): \_\_\_\_\_

Weight (in pounds): \_\_\_\_\_

Occupation: \_\_\_\_\_

*Please Circle your answer for the following questions -*

Marital Status:

1. Single
2. Married
3. Divorced
4. Separated
5. Widowed

Ethnicity:

1. Hispanic or Latino
2. Not Hispanic or Latino

Race:

1. American Indian or Alaska Native
2. Asian
3. Black or African American
4. Native Hawaiian or Other Pacific Islander
5. White
6. Other: \_\_\_\_\_

Gender:

1. Male
2. Female
3. Transgender

Highest Level Education Completed:

1. Grammar School
2. High School or equivalent
3. Vocational/Technical School (2 years)
4. Some College
5. College Graduate
6. Master's Degree (MS)
7. Doctoral Degree (PhD)
8. Professional Degree (MD, JD, etc.)
9. Other: \_\_\_\_\_

## **Appendix C. Adherence Questionnaires**

### **Adherence Questionnaire – Patient Version**

Please rate your responses based on the current session you are participating in or based on the past week of home exercises. Write your responses on the blank next to each question.

- 1.Strongly Disagree
- 2.Disagree
- 3.Neither
- 4.Agree
- 5.Strongly Agree

#### **Physical Therapy Sessions**

1. \_\_\_\_\_ I followed through with the therapist's instructions in my physical therapy session.
2. \_\_\_\_\_ I preformed to the best of my ability in the physical therapy session.
3. \_\_\_\_\_ I was actively involved in the physical therapy session.

#### **Home Exercises**

1. \_\_\_\_\_ I completed the list home exercises my physical therapist recommended.
2. \_\_\_\_\_ I preformed the home exercises the recommended amount of times during the past week.
3. \_\_\_\_\_ I was actively involved in the home exercises throughout the week.
4. \_\_\_\_\_ I preformed the home exercises to the best of my ability.

### **Adherence Questionnaire – Therapist Version**

Please rate your responses based on the current session the client is participating in or based on the client's completion of home exercises. Write your responses on the blank next to each question.

- 1.Strongly Disagree
- 2.Disagree
- 3.Neither
- 4.Agree
- 5.Strongly Agree

#### **Physical Therapy Sessions**

1. \_\_\_\_\_ The patient followed through with the therapist's instructions in the physical therapy session.

2. \_\_\_\_\_ The patient performed to the best of his or her ability in the physical therapy session.
3. \_\_\_\_\_ The patient was actively involved in the physical therapy session.

#### Home Exercises

1. \_\_\_\_\_ The patient completed the list home exercises the physical therapist recommended.
2. \_\_\_\_\_ The patient performed the home exercises the recommended amount of times during the past week.
3. \_\_\_\_\_ The patient was actively involved in the home exercises throughout the week.
4. \_\_\_\_\_ The patient performed the home exercises to the best of his or her ability.

## **Appendix D. Outcome Questionnaires**

### **Outcome Questionnaire – Patient Version**

Please rate your responses based on the completion of the prescribed physical therapy. Write your responses on the blank next to each question.

- 6.Strongly Disagree
- 7.Disagree
- 8.Neither
- 9.Agree
- 10.Strongly Agree

- 1. \_\_\_\_\_ I improved as I expected.
- 2. \_\_\_\_\_ My injury is better off after completion of physical therapy.
- 3. \_\_\_\_\_ The amount of pain has decreased compared to the beginning of treatment.
- 4. \_\_\_\_\_ Physical therapy was worthwhile and useful for me.
- 5. \_\_\_\_\_ Acceptance and Commitment Therapy (ACT) was worthwhile and useful for me.
- 6. \_\_\_\_\_ The ACT intervention taught me something new about myself and about how to think about the world.

### **Outcome Questionnaire – Therapist Version**

Please rate your responses based on the patient's completion of the prescribed physical therapy. Write your responses on the blank next to each question.

- 1.Strongly Disagree
- 2.Disagree
- 3.Neither
- 4.Agree
- 5.Strongly Agree

- 1. \_\_\_\_\_ The patient improved as expected.
- 2. \_\_\_\_\_ The patient's injury is better off after completion of physical therapy.
- 3. \_\_\_\_\_ The amount of pain the patient experiences has decreased compared to the beginning of treatment.
- 4. \_\_\_\_\_ Physical therapy was worthwhile and useful for the patient.

## Appendix E. Human Subjects IRB Approval

### IRB Notice

IRB <irb\_no\_reply@cayuse.com>

Reply all

To:

Rost, Ann D;

Cc:

Battles, Jennifer A;

Wallentine, Scott W;

Robinson, Barbara Susan;

...

Thu 8/20/2015 1:29 PM

Thesis

**To:** Ann Rost

Psychology

901 S National Ave Springfield MO 65897-0027

**Approval Date:** 8/20/2015

**Expiration Date of Approval:** 8/19/2016

**RE:** Notice of IRB Approval by Expedited Review (under 45 CFR 46.110)

**Submission Type:** Initial

**Expedited Category:** 7.Surveys/interviews/focus groups

**Study #:** 16-0026

**Study Title:** Acceptance-Based Interventions and Physical Therapy

This submission has been approved by the above IRB for the period indicated. It has been determined that the risk involved in this research is no more than minimal.

#### Investigator's Responsibilities:

Federal regulations require that all research be reviewed at least annually. It is the Principal Investigator's responsibility to submit for renewal and obtain approval before the expiration date. You may not continue any research activity beyond the expiration date without IRB approval. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.

You are required to obtain IRB approval for any changes to any aspect of this study before they can be implemented (use the procedures found at

<http://orc.missouristate.edu>). Should any adverse event or unanticipated problem involving risks to subjects or others occur it must be reported immediately to the IRB following the adverse event procedures at the same website.

This study was reviewed in accordance with federal regulations governing human subjects research, including those found at 45 CFR 46 (Common Rule), 45 CFR 164 (HIPAA), 21 CFR 50 & 56 (FDA), and 40 CFR 26 (EPA), where applicable.

CC:

Jennifer Barnes

Scott Wallentine, Physical Therapy

Barbara Robinson, Physical Therapy



## Appendix F. Intervention Protocol

### Protocol for ACT Sessions for Physical Therapy Patients

Adapted from

1. Dahl, Wilson, Luciano, and Hayes (2005) Acceptance and Commitment Therapy for Chronic Pain
2. Dahl and Lundgren (2006) Living Beyond Your Pain: Using Acceptance and Commitment Therapy to Ease Chronic Pain
3. Vowles & Sorrell (2007) Life with Chronic Pain: An Acceptance-based Approach: Therapist Guide and Patient Workbook

#### Session 1

##### ***1. Validation of suffering and consequential loss of life quality (due to pain from injury or chronic pain)***

- A. Understand back story and get to know the client's current situation
- B. If they are suffering from chronic pain, gain an understanding of the impact it has had on their life from all perspectives (work, school, family, leisure, etc...)

##### ***2. Values***

- A. What are values?
- B. Create life compass
- C. Next, write what solutions they have tried for these problems (the barriers that hold them back from living according to their values)

##### ***3. Creative Hopelessness and Change***

- A. Work through with the patient the discrepancy between what they have tried in the past to reduce pain and how that has not worked
- B. Exercise on Willingness and Pain
- C. Take time to explain exposure: need to have a willingness to feel discomfort in order to move in a valued direction

##### ***4. What do you want to work on:***

- A. Have the patient choose two or three life dimensions that have the largest discrepancies and those that they want to focus on in therapy
- B. Ask: "what do you intend to do that night, the next day, and the next week to put your intentions into action"
- C. Remember to move in a valued direction, you must be willing to feel the discomfort of the symptoms you have been working to avoid
- D. Can you make this commitment to move in a valued direction? What would that look like for physical therapy?

#### Session 2

##### ***1. Review the life compass from the previous sessions:*** Did you find yourself doing anything that shows you were living in a valued direction?

##### ***2. Cognitive Defusion***

- A. *Goal of Session:* The goal of today is to gain distance from our thoughts.

- Repeated phrase exercise: Repeat a difficult thought that you have over and over again.
- B.Screen Metaphor
- C.Avoiding Thoughts: We can't just avoid or control our thoughts either, so now what?
  - Chocolate Milk Exercise
  - Bus Driver Metaphor
- D.The Thought Observer: So how do cognitive defusion?
  - Car Driving By Metaphor
- E.Labeling Thoughts: Another way to find distance from our thoughts is by labeling the thoughts as simply thoughts.
- F.Power of Words – But/And
- G.What is your secret exercise (optional)
- 3.Exposure/Conclusion/Homework:**
  - A.Cognitive defusion is difficult, so it is important to practice observing our thoughts and labeling our thoughts often. Remember that screen, we will talk next week about the importance of being willing to experience discomfort in order to move in a valued direction, or else we are simple avoiding what is important in our lives.
  - B.End with asking the client to make a commitment to where they are going and how they are going to get there, and how they will confront these unpleasant barriers. Relate to physical therapy.

### **Session 3**

- 1.Meta visualization:** Funeral exercise
- 2.Exercises in cognitive defusion:**
  - A. Leaf on a Stream Metaphor (Schneck, 2015)
- 3.Willingness to feel discomfort (relate to values)**
  - A.Revisit Willingness Question from Beginning
  - B.What is Willingness?
  - C.Joe the Bum Metaphor?
  - D.The Bubble in the Road Metaphor:
- 4.Exposure exercises: Mindfulness**
  - A.Goal of Mindfulness: Operating in your life from the observer self.
  - B.When to Practice
  - C.Where to Practice
  - D.How to Practice
  - E.Mindfulness Exercises: (important to present multiple options to patients and let them know to choose what works best for them)
    - Handout on Being in the Moment
    - Handout on Mindfulness Body Scan
    - Mindful Walking
    - Mindful Journaling

**5.Homework:**

- A.Complete the exercise: Observer-self exercise (optional)
- B.Practice Mindfulness and Cognitive Defusion Throughout the Week
- C.Continue to Do Something throughout the week that is consistent with you values – physical therapy home exercises!

**Session 4**

**1.Values:**

- A.Begin with asking what they did this week to live consistently with their values (also review homework)
- B.Reintroduce Willingness and Values
- C.Complete the Willingness and Commitment Worksheet: Try to use the value of physical self care in relation to physical therapy.

**2.Acceptance:**

- A.What Does Acceptance Mean
- B.Broad field of vision.
- C.Acceptance is an ongoing process

**3.Commitment:**

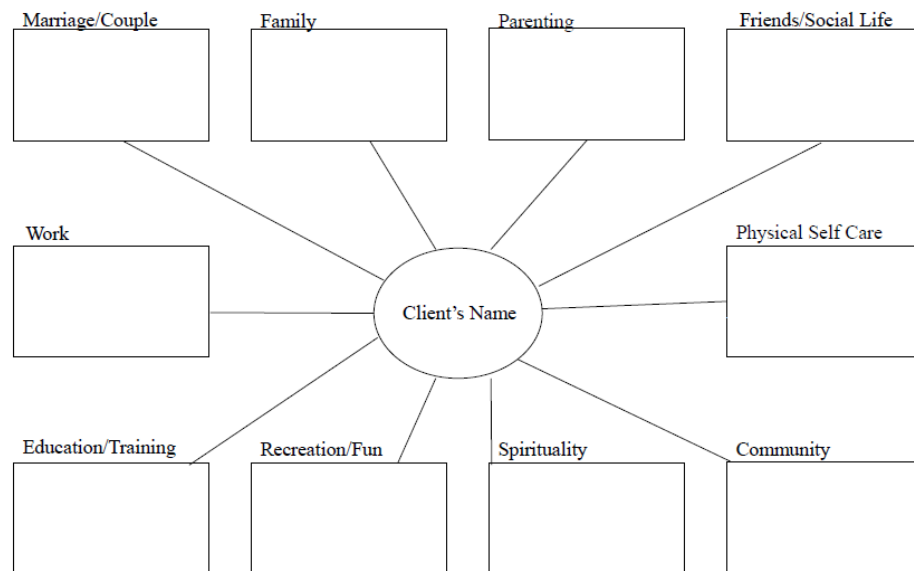
- A.Throughout treatment, I have asked you to make commitments to valued action. Know that with all of these commitments there will be setbacks. Setbacks are to be expected. What do we do when they occur?
- B.At the end of the session the client is asked to state and write down commitments in the form of steps that he or she is now willing to take in valued directions along with what activities which will be required for taking those steps.
- C. Review what has transpired in therapy, and thank the patient for their time and effort. Present them with some resources if they would like to continue their journey in ACT.

Living Beyond Your Pain: Using Acceptance and Commitment Therapy to Ease Chronic Pain by Joanne Dahl and Tobias Lundgren

Or

Get Out of Your Mind & Into Your Life: The New Acceptance and Commitment Therapy by Steven Hayes with Spencer Smith

## Appendix G. Values Compass Example



\*In each box describe what that value would ideally look like in your life.