

University of Nevada, Reno

**A Pilot Evaluation of www.treatyourpain.com: An Interactive Empirically
Based Intervention for the Management of Persistent Pain in Older Adults.**

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in
Clinical Psychology

by

Victoria Elizabeth Mercer

Dr. William T. O'Donohue/Dissertation Advisor

August, 2011

© by Victoria E. Mercer, 2011

All Rights Reserved



University of Nevada, Reno
Reno • Washoe • Winnemucca

THE GRADUATE SCHOOL

We recommend that the dissertation
prepared under our supervision by

VICTORIA ELIZABETH MERCER

entitled

**A Pilot Evaluation Of www.treatyourpain.com:
An Interactive Empirically Based Intervention For The
Management Of Persistent Pain In Older Adults.**

be accepted in partial fulfillment of the
requirements for the degree of

DOCTOR OF PHILOSOPHY

William T. O'Donohue, Ph.D., Advisor

Melanie P. Duckworth, Ph.D., Committee Member

Jane E. Fisher, Ph.D., Committee Member

Anthony Papa, Ph.D., Committee Member

Michael J. Lewandowski, Ph.D., Committee Member

Alice Running, Ph.D., Graduate School Representative

Marsha H. Read, Ph. D., Associate Dean, Graduate School

August, 2011

Abstract

In response to the growing chronic pain epidemic amongst adults age 60 and older (AGS Panel on Chronic Pain in Older Persons, 1998; Ardrey, Herr, Titler, Sorofman, & Schmitt, 2003; Morlin, et al., 2008), this study conducted a feasibility pilot of an innovative eHealth service in an effort to address the need to deliver a cost-effective, easily disseminateable, empirically based chronic pain treatment program to this often underserved population (Robinson, 2007; Landi, Onder, Cesari, et al., 2001; Won, Lapane, Gambassi, et al., 1999; Sengstaken & King, 1993). Consistent with the goals and procedures of Stage 1 behavioral treatment development research (McNamara et al., 2002; Rounsaville, Carroll, & Onken, 2001), this study had four primary aims: 1) develop the www.treatyourpain.com Internet treatment program; 2) evaluate hypothesized mechanisms of change by examining the extent to which the intervention enhanced individual coping skill acquisition and health promoting behavior; 3) evaluate the degree to which this program promoted improvements in overall pain related health status; and 4) assess participant acceptance of the treatment. Additional project goals included establishing the necessary sample size to conduct future randomized controlled trials and examine the cost-effectiveness of the intervention. To this end, we employed a randomized controlled feasibility trial design. The preliminary results of the study suggest that participants in the intervention experimental condition improved more significantly than those in the control condition on measures of overall health status, coping skill acquisition, and implementation of health promoting behaviors. This study provides

preliminary evidence that an Internet-based chronic pain treatment program tailored specifically to the needs of older adults is both plausible and cost-effective as a first line treatment for this high utilizing population. The individuals who received the experimental condition reported significantly higher levels of satisfaction with and acceptance of the services they received compared to individuals in the control condition. Using a simple advertising strategy, the study was able to efficiently recruit enough web-traffic to meet our sample requirement. Additionally, once services began the study maintained an impressive 100% retention rate. Both of these particulars confirm that older adults are willing to seek out and receive psychological treatment over the Internet. Furthermore, providing tailored psychological treatment services over the Internet was found to offer substantial incremental cost effectiveness when compared to the estimated costs of face-to-face psychological care and the leading online pain website that served as this studies control. The implications from this study and future research directions are discussed.

Dedication

To my husband, David, and son, McKinley, who have been and will continue to be my sources of unwavering love and support. To Mac, for helping keep my life in perspective. To my larger family whose teachings, support, and guidance have allowed me to become who I am. Thank you, I could not have done this without you.

Acknowledgements

I would like to acknowledge the advisory committee for their thoughtful comments, dedication, and generosity of time and ideas in the development and evaluation of the treatment and the careful review of this manuscript. In particular, I would like to thank Melanie Duckworth, Ph.D., Jane Fisher, Ph.D., Michael Lewandowski, Ph.D., Anthony Papa, Ph.D., and Alice Running, Ph.D., R.N., A.P.N. I would also like to extend my sincerest thanks to William T. O'Donohue, Ph.D., my dissertation advisor, for his accessibility, pioneering spirit in the field of clinical psychology, and invaluable mentorship.

TABLE OF CONTENTS

	PAGE
ABSTRACT	i
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
CHAPTER 1	
Introduction	1
Overview of the Current Study	1
Overview of Chronic Pain Models	2
Mechanisms of Change	5
Overview of Chronic Pain in Older Adults	9
Overview of Chronic Pain Treatment	11
Treatment as Usual	11
Alternative Treatment	11
Psychological Treatment	12
Treatment Satisfaction	13
Novel-Treatment Approaches	14
Computer-aided Psychotherapy	14
Overview of Computer Use Amongst Older Adults	18
Website Design Heuristics	23

Overview of the Public Health Problem of Pain	24
Critical Analysis and Discussion	27
Study Design	27
Scalability and Dissemination	29
Social Validity and Quality Improvement	30
CHAPTER 2	
Present Study	31
Purpose	31
Rationale	32
Hypotheses	33
CHAPTER 3	
Method	34
Participants	34
Sample Size	35
Inclusion/Exclusion	35
Recruitment Process	35
Overview of Design and Procedure	35
Current Study Design and Intervention Content	40
Procedures	52
Measures	58
Analyses	61
Participant Safety and Risk Mitigation	61
CHAPTER 4	

Results	63
Phase 1: Treatment Development and Retention	
Analysis	63
Phase 2: Evaluation of Hypothesized Mechanisms of	
Change	66
Demographics	67
Hypothesis 1	68
0-10 Pain Intensity Scale	68
Multidimensional Pain Inventory (MPI) Pain Intensity	69
MPI Pain Interference	70
MPI Life Control	71
MPI Affective Distress	71
General Health Questionnaire (GHQ) General	
Measure of Psychological Wellbeing	72
Hypothesis 2	73
Coping Strategies Questionnaire (CSQ) Coping	
Self-Statements	73
CSQ Catastrophizing	74
CSQ Praying and Hoping	75
CSQ Ignoring Pain Sensations	76
CSQ Increased Pain Behaviors	76
CSQ Relax	77
MPI Support	78

Health Promoting Activity and Engagement	79
Geriatric Pain Measure (GPM) Disengagement Subscale	79
GPM Ambulation	80
Medication Use	81
Hypothesis 3	82
Treatment Satisfaction	83
Additional Project Goals:	
Effect Size, Power, and Sample Size	87
Cost Effectiveness Data	88
CHAPTER 5	
Discussion	91
Prospects	91
Limitations and Evaluations of Trends	92
Hypothesis 1: Movement Toward Efficacy on Health	
Status Variables Pain Intensity, Pain Interference, Life Control, Affective Distress	92
Hypothesis 2: Skill Acquisition and Health	
Promoting Behaviors	96
Hypothesis 3: Treatment Acceptance	100
Additional Project Goals:	102
Effect Size, Power, and Sample Size	102
Cost-Effectiveness	102
Future Research: Opportunities of Treatment Design	

And Implementation	106
REFERENCES	115
APPENDICES	
A: Example of Secure Data Collection Screens	128
B: Examples of Each Treatment Module Screens	130
C: Examples of Administrative Screens	134
D: Email Contact	136
E: Examples of PDF Handouts	137

LIST OF TABLES

TABLE		PAGE
1	Module Competency and Acceptability Ratings	83
2	Satisfaction Data for Treatment and Control Group Participants by Questionnaire Item	86
3	Client Satisfaction Questionnaire Item Analysis	86
4	Actual and Estimated Treatment Costs	89

LIST OF FIGURES

FIGURE		PAGE
1	Retention Analysis	64

Chapter 1

Introduction

Overview of the Current Study

Epidemiologic studies have found that older adults, defined in this study as persons over the age of 60 years, account for over seven percent of the world's population or 420 million people; furthermore, a substantial segment of this population experience high rates of health problems, one of which is chronic pain (Wan, Sengupta, Velkoff, & De Barros, 2005; Census Bureau, 2001; AGS Panel on Chronic Pain in Older Persons, 1998). The medical and psychological issues incurred due to coping with chronic pain result in years of costly disease management and high service utilization (Ardrey, Herr, Titler, Sorofman, & Schmitt, 2003; AGS Panel on Chronic Pain in Older Persons, 1998). These increased medical costs and utilization, let alone the burden of coping with pain on the individual level, demand researchers explore more efficient methods by which to deliver empirically supported treatments for health related issues amongst older adults. This study aims to conduct a feasibility pilot of such a method, www.treatyourpain.com; an empirically based persistent pain management treatment program for older adults delivered entirely via the Internet. Chapter One of this study will review different theoretical models of chronic pain, epidemiology of chronic pain in older adults, examine empirically supported treatment approaches, discuss the challenges of chronic pain as a public health problem, explore novel treatment approaches, and conclude with a critical analysis and discussion of extant literature on chronic pain in older adults.

Chapter Two will report on the methodology used in the current feasibility pilot study. Chapter Three will report the results of this study, including: lessons learned through treatment development and implementation including retention of participants; impact of the intervention on participants' health status; implementation of health related skills and health behavior promotion; acceptability of the intervention; power analysis for use in establishing sample size to be used in future research; and cost-effectiveness analysis. Chapter Four will systematically explore the prospects and problems learned in the process of conducting this intervention, and conclude with a discussion of future research,

Overview of Chronic Pain Models

There are four primary models for chronic pain: the biomedical model, operant behavioral model, gate control model, and biopsychosocial model (Gatchel & Turk, 1996; Schwartz & Ehde, 2000). The biomedical model is a dualistic model that assumes symptoms of a disease-state process are responsible for a person's pain (Schwartz & Ehde, 2000). According to this model, treatment of pain should be directed at correcting an objectively identified organic dysfunction. This model has been criticized because it recognizes psychosocial variables as reactions to pain, rather than as having an interactional influence on a person's experience of pain (Schwartz & Ehde, 2000). The operant behavioral model, pioneered by Fordyce (1976), suggests that pain behaviors (e.g., verbal complaints, non-verbal complaints, posturing, and functional displays of disability) provide an observable and objective method of pain assessment and permit intervention on the environmental contingencies that

produce and maintain those behaviors (Fordyce, 1976). The operant behavioral model is criticized, like the biomedical or sensory model, as being unidimensional in nature and thereby not accounting for the interaction of other subjective variables (Turk & Flor, 1987). The gate control theory of pain conceptualizes pain as consisting of three components: motivational-affective, cognitive-evaluative, and sensory-discriminative, which impact pain in a multidimensional way (Melzack & Wall, 1965). This model took a radical step forward from the biomedical model of pain in two ways: first, by integrating the role of psychological factors in one's subjective pain experience and second, by considering that there was more than a one-to-one relationship between pathophysiology and pain symptoms. Overall, the gate control theory has proved to be remarkably resilient and of great heuristic value (Turk & Monarch, 2001). However, the gate control model has been criticized as being unclear and incomplete in its physiological details (Nathan, 1976; Price, 1987; Wall, 1989). Melzack (1999) has recently extended the gate control theory by integrating it with Selye's (1950) model of stress. While this conceptualization, called the neuromatrix theory, is not a primary model of pain it deserves mention in terms of its heuristic value and potential to stimulate future research. The neuromatrix model states that each person contains a "body-self neuromatrix" that is both genetically determined and influenced by sensory experience and learning. The neuromatrix can be triggered by either sensory inputs or centrally independent stimulation (Melzack, 1999). When an organism receives an injury there is a disruption of its homeostatic regulation, this is stressful and initiates a range of

neural, hormonal, and behavioral mechanisms to restore homeostasis (Selye, 1950). This process may result in immune suppression and limbic system activation that perpetuates illness (Melzack, 1999). While the neuromatrix theory offers a well-integrated model of pain its components are currently without systematic investigation (Turk & Monarch, 2002).

The biopsychosocial model of pain extended the gate control and operant models to conceptualize chronic pain as the result of an interaction between biological, psychological, and social variables present in the person and their environment (Turk, & Monarch, 2002; Schwartz & Ehde, 2000). Chronic pain is a dynamic and subjective experience that researchers have established results from the “transduction, transmission, and modulation of sensory input filtered through a person’s genetic composition and prior learning history and modulated further by the person’s current physiological status, idiosyncratic appraisals, expectations, current mood state, and sociocultural environment” (Turk & Monarch, 2002, pg. 7). The biopsychosocial perspective explains the diversity of an individual’s illness expression (symptom severity, duration, and consequences) by the dynamic longitudinal interrelationships between their biological changes, psychological status, and social and cultural contexts (Turk & Monarch, 2002). Researchers suggest that you view a person’s pain longitudinally in order to account for the ongoing, multifactoral processes that encompass the interplay between the different factors in the biopsychosocial model. Intermittently biological, psychological, social, and cultural factors each account for different amounts of variance in an individual’s explanatory model of

chronic pain. During the acute phase of disease biological factors probably play the largest role, in later chronic phases psychological and social factors account for more pain symptoms and dysfunction. Research has shown that there is considerable variability in behavioral and psychological expressions of dysfunction across persons with similar symptoms and within individuals over time (Crook, Weir, & Tunks, 1989). A longitudinal perspective is essential, as a cross-sectional sample will only permit consideration of these factors in a specific context rather than as a continually evolving and interacting adaptation to all of the different biopsychosocial factors. The biopsychosocial model is heralded as an inclusive perspective that encompasses: 1) integrated action, 2) reciprocal determinism, and 3) development and evolution (Turk & Monarch, 2002).

Mechanisms of Change. The unique but interdependent components of the biopsychosocial model result in a number of different change-process variables. Inherent in the longitudinal multi-component perspective is that the process of change will evolve as the different factors are more or less influential in defining an individual's chronic pain experience. In this study we focused consideration and exploration on the mechanisms of change operating in the psychological realm of the biopsychosocial model of pain. For example, we did not gather data on the biological factors, such as whether the individual suffered an additional illness or injury that confounded their original chronic pain intensity scores. Nor did we gather information on the social or cultural factors, such as whether the individual got a new interpersonal resource or a new job during the course of the study. Therefore, it must be stated that the psychological factors

being explored in this study need to be considered in the context of and in perspective with the fluidity of the chronic pain factors, and this context and perspective may not be fully known.

To compound the difficulty of researching the psychological change process variables, the conceptualization and meaning attributed to these variables varies dramatically across the psychotherapy field (Morley & Williams, 2002). Process research comparing different psychotherapies with similar outcomes for the same patients produces conclusions largely consistent with Rogerian tenants of the importance of empathy, support, and nonjudgmental acceptance in bringing about change (Morely & Williams, 2002). Ablon and Jones (1999) point out the difficulty of dismantling therapeutic effects that are summed across patients and therapists when “specific interventions do not have fixed meanings independent of context and cannot be assumed to contribute discretely and uniquely to outcome” (p. 73).

This limitation being said, we believe it is better to define hypothesized mechanisms of change variables and measure these variables in an effort to produce theory driven research. We will review the different hypothesized mechanisms active in the experience and maintenance of chronic pain and then discuss the mechanisms we targeted in the present study. Researchers have hypothesized that social learning mechanisms are active in the acquisition and expression of pain behaviors (e.g., overt expressions of pain, distress, and suffering; Turk & Monarch, 2002). This theory posits that people acquire attitudes about health and health care as children and these attitudes are shaped

and reinforced in the individual's environment. Operant learning mechanisms posit that individuals are exposed to tissue damage resulting in pain, which produces withdrawal or escape from the stimulus. These operant responses (motoric in nature) will be observable and hence subject to the principles of reinforcement. Pain becomes persistent through the external contingencies of reinforcement and often "well behaviors" are not sufficiently positively reinforced and get extinguished. The change process variables include the extinction of pain behaviors and increase of well behaviors by positive reinforcement. Respondent learning mechanisms state that people in pain may generalize increases in pain with all kinds of stimuli that were originally associated with the pain stimulation. If pain symptoms continue the individual may experience anxiety and/or anticipatory pain and depression because of the low rate of reinforcement obtained when behavior is greatly reduced (Turk & Monarch, 2002).

Cognitive factors include beliefs about pain, controllability, self-efficacy, cognitive errors, and coping (Turk & Monarch, 2002). The research has demonstrated that if successful rehabilitation occurs, there appears to be a cognitive shift from a belief that one's pain is hopeless and their role passive to beliefs about resourcefulness and one's ability to function regardless of pain (Turk & Monarch, 2002). Individuals experiencing chronic pain typically perceive a lack of personal control, most likely attributable to their unsuccessful attempts to reduce pain intensity or its impact. Related to beliefs about controllability is the concept of "self-efficacy." Self-efficacy means that one believes that one can

successfully execute a course of effective action to produce a desired outcome. Research has found that individuals with chronic pain make numerous cognitive errors including errors around their individual perceptions of pain, affective distress, and disability (Smith, Aberger, Follick, & Abern, 1986). Catastrophizing appears to be a particularly potent cognitive error that influences pain and disability (Turk & Monarch, 2002). The coping behaviors an individual employs to manage their chronic pain can have a large impact on their change process. Coping includes an individual's many different methods of dealing with, adjusting to pain, and reducing or minimizing the distress caused by pain. Research has found that active coping strategies, efforts to function in spite of pain or to distract oneself from pain, are associated with adaptive functioning and positive change processes, while passive coping strategies, such as depending on others, restricting activities, are associated with maladaptive functioning and negative change (Turk, Okifuji, Sinclair, & Start, 1996; Turk & Rudy, 1990; Walter & Brannon, 1991). Affective factors also establish additional mechanisms of change. Depression, anxiety, and anger are all hypothesized to have significant roles in the development and maintenance of chronic pain. Lastly, personality factors are considered to offer change process variables yet the research has received little support and has often been challenged (Turk & Monarch, 2002). Personality process-change variables have to do with the provision of alternate responses and the extinction or modification of the faulty interpretations or expectation (Turk & Monarch, 2002). We will focus on the measurement and

exploration of catastrophizing, adaptive coping strategies, and behavioral activation, three of the most well documented mechanisms of change.

Overview of Chronic Pain in Older Adults

Epidemiologists estimate that older adults, defined as persons over the age of 65 years, account for over seven percent of the world's population or 420 million people (AGS Panel on Chronic Pain in Older Persons, 1998). In 2003 older adults accounted for 12 percent of the total US population, 35.9 million people, and this percentage is predicted to double in size within the next 25 years (Wan, Sengupta, Velkoff, & De Barros, 2005; Census Bureau, 2001). Older adults account for significant health spending with average annual per person personal health care spending of \$14,797 (U.S. Department of Health & Human Services, 2004). This amount was 5.6 times higher than spending per child and 3.3 times the spending per working-age person.

While scientific advances and lifestyle factors have enabled older adults to have longer life spans and overall better health than ever before, the longer life spans have resulted in higher rates of chronic illness. Eighty percent of older adults experience at least one chronic health condition such as osteoarthritis and 50% have two (Wan, Sengupta, Velkoff, & De Barros, 2005). Regardless of how long an individual lives, over time there is an ongoing degradation of ones' organs and body systems that results in health difficulties (Mayo Clinic, 2008). With aging the cardiovascular, skeletal, digestive, excretory, nervous, sensory, epithelial, metabolic and sexual systems all experience physiological changes that cause health problems. However, regardless of the difficulties experienced

due to the aging process the average life expectancy continues to increase in the US, with individuals living an average of 77 years. A common consequence of these physiological changes occurring across longer life spans is persistent pain (Mayo Clinic, 2008). Persistent pain has been described as a malefic force that often imposes severe emotional, physical, economic, and social stresses on the patient on the family, and is one of the most costly health problems for society (Bonica, 1990).

Given the nature of the health and aging, it is unsurprising that approximately one in five older Americans is affected by persistent or chronic pain (AGS Panel on Chronic Pain in Older Persons, 1998; Wan, Sengupta, Velkoff, & De Barros, 2005). In addition to the illness or injury that resulted in the occurrence of persistent pain, pain itself causes further deleterious psychological and physical consequences on healthy aging (Harkins, 2002). Psychological consequences of persistent pain include problems such as increased stress, anxiety, depression, and social isolation; all of which can be connected to additional cognitive dysfunction (AGS Panel on Chronic Pain in Older Persons, 1998; Ferrel, 1991; Tse, Pun, & Benzie, 2005). Physical consequences to persistent pain include problems with sleep, nutrition, disturbed ambulation and gait (AGS Panel on Chronic Pain in Older Persons, 1998). For older adults persistent pain and its consequences account for even greater healthcare utilization and costs (Ardrey, Herr, Titler, Sorofman, & Schmitt, 2003; AGS Panel on Chronic Pain in Older Persons, 1998). In 1997, annual estimated costs

incurred in the US for treating arthritis and related disorders alone were \$86 billion (MMWR, 2004).

Overview of Chronic Pain Treatment

Treatment as Usual. Older adults manage their acute and persistent pain using many different methods. Individuals most commonly receive treatment for pain from their primary care physician (Cooner & Amorosi, 1997). First line pain treatment is typically pharmacologic in nature (AGS Panel on Chronic Pain in Older Persons, 1998; AGS Panel on Persistent Pain in Older Persons, 2002). Many older adults consume one or more over-the-counter or prescription analgesic medications. However, while pharmacologic treatments may bring rapid relief to older adults living with pain, chronic consumption of pharmacological agents results in further health incursions. These incursions include life-threatening medication side effects, polypharmacy interaction effects, and excess disability due to the sedation and cognitive impairment caused by analgesic medications (Fishman, & Teichera, 2003). These and other negative medication effects have led researchers to emphasize the importance of focusing resources on assessing and addressing barriers to older adults' use of alternative nonpharmacologic interventions to treat persistent pain (AGS Panel on Chronic Pain in Older Persons, 1998; Tse, Pun, & Benzie, 2005).

Alternative Treatments. Nonpharmacologic treatments include: acupuncture, chiropractic, cryotherapy, relaxation strategies, education programs, psychological services, and general distraction strategies (AGS Panel on Chronic Pain in Older Persons, 1998; Blomqvist, 2003). The literature

suggests that some older adults coping with chronic pain employ alternative therapies even when their primary care physician is unsupportive of the therapy (AGS Panel on Chronic Pain in Older Persons, 1998). The medical community is generally accepting of nonpharmacologic interventions when used in conjunction with pharmacologic ones (AGS Panel on Chronic Pain in Older Persons, 1998; Tse, Pun, & Benzie, 2005). Psychological services offer a particularly useful treatment to older adults living with persistent pain because of the focus on managing and accepting pain rather than eliminating pain, which may not be a physical possibility for many older adults (Rudy, Hanlon, & Markham, 2002).

Psychological Treatments. Persistent pain rehabilitation programs including core cognitive-behavioral components have shown multiple benefits amongst older patients (Sorkin, Rudy, Hanlon, Turk, & Stieg, 1990; Keefe, Caldwell, Williams, Gill, Mitchell, Robertson, et al., 1990; Fry & Wong, 1991; Keefe & Williams, 1990; Arena, Hightower, & Chang, 1988; Arena, Hannah, Bruno, & Meador, 1991; Middaugh, Kee, Peters, & Herman, 1992; Middaugh, Woods, Kee, Harden, & Peters, 1991; Kerns, Turk, & Rudy, 1985; Cutler, Fishbain, Steel-Rosomoff, & Rossomoff, 1994). The American Psychological Association Division 12 Task Force Criteria for empirically validated care (also known as the Chambless Report) states that this cognitive-behavioral approach for chronic pain management is considered "useful" (Keefe, 1996). Furthermore, the techniques employed in this protocol are currently recommended by the following nationally recognized associations' websites: The American Geriatric Societies Foundation for Health in Aging, American Chronic Pain Association,

National Chronic Pain Outreach Association, American Pain Society, Arthritis Foundation, and the National Pain Foundation.

Current cognitive-behavioral pain management approaches tailored to the needs of older adults include five core components: 1) education on the role of psychology in chronic pain treatment, the biopsychosocial model of pain, the role of antecedent and consequent factors on pain, epidemiologic data on chronic pain amongst older adults, 2) skills acquisition such as relaxation and mindfulness exercises aimed at physiologic tension reduction and behavior modification targeted at pain behaviors and faulty beliefs, 3) cognitive and behavioral rehearsal of the relaxation and behavior modification skills, 4) homework exercises to practice and rehearse skills in home and community settings, and 5) generalization and maintenance skills such as problem-solving and anticipating setbacks (Rudy, Hanlon, & Markham, 2002).

Treatment Satisfaction. In accordance with existing literature (Czaja, Charness, Fisk, et al., 2006; Kerns, Otis, Rosenberg, & Reid, 2003) our previous needs assessment study (Mercer & O'Donohue, in preparation) found many older adults are not receiving appropriate care for their pain and/or express low levels of satisfaction with their current treatment. A basic principle in the provision of services to older adults is ensuring adequate understanding of their unique needs and what they experience as barriers to accessing services (Mui, & Domanski, 1999; Kerns, Otis, Rosenberg, & Reid, 2003). Existing literature identified the following barriers to treatment: economic constraints, problems with accessibility, lack of knowledge of treatment options, and lack of providers in a

geographic area (Czaja, Charness, Fisk, et al., 2006; Kerns, Otis, Rosenberg, & Reid, 2003). If psychological interventions are going to aid older adults in the management of their chronic pain and pain related suffering they must overcome these barriers and must ensure that they are satisfied with the treatment they receive.

Novel-treatment approaches

Computer-aided Psychotherapy. Treating pain in general adult populations via the Internet with eHealth or computer-aided psychotherapy is not an entirely new idea. A small number of studies using computer-aided psychotherapy to treat pain have been published (Marks, Cavanagh, & Gega, 2007). Three of those studies were RCTs for the treatment of headache pain on the Internet, one was an RCT of back pain, and one study used virtual reality for pain management during burn wound dressing changes. Each study will be briefly reviewed below. The first study by Strom and colleagues (2000) was Swedish computer-aided psychotherapy delivered over the Internet for the treatment of recurrent headache disorder. The RCT ran for six weeks and was comprised of an experimental group consisting of access to the computer aided psychotherapy and email support versus a waitlist control. The main components of the program included training in progressive relaxation, release-only relaxation without tension, cue-controlled relaxation, differential relaxation, rapid relaxation, and application of relaxation in stressful situations. These modules were sent to the participants via email correspondence. The study included 102 Swedish patients with recurrent headache disorder and concluded with 20 patients in the

experimental group and 25 in the waitlist control. All patients' monitored symptoms, total times using relaxation and problem-solving skills, and self-reported these data via email. Among completers the Internet experimental group compared to the waitlist control resulted in significantly fewer headaches (31% versus 3%) and more patients whose headaches reduced by 50% or more without increasing their medication and more clinically significant improvement (50% versus 4% of subjects). While the study purported cost-efficiency of 12 times greater than usual clinical treatment based on the percentage of improvement as a factor of therapist time (40 minutes) the study had many weaknesses. These weaknesses included a lack of follow-up, 56% dropout rate, and did not have an attention placebo in the waitlist.

The second study reviewed was another computer-aided psychotherapy RCT from Sweden for the treatment of headache. This study by Andersson and colleagues (2003) upgraded the earlier computer-aided psychotherapy used by Strom and colleagues (2000) by adding a weekly therapist initiated phone call to users. Like the earlier study patients were recruited via newspaper and Internet ads and screened via the Internet. The recruitment process resulted in a small group of 44 suitable subjects participating in the study. These 44 were randomized to either six weeks of an Internet computer-aided psychotherapy with email support and weekly therapist-initiated phone calls for a mean of ten minutes to foster treatment adherence; or to the Internet computer-aided psychotherapy plus only email not phone support. The study was enhanced by the inclusion of automatic progression through the modules upon the completion

of registration, information prior to beginning relaxation training on the role of psychological factors in headache reduction. The applied relaxation techniques were then emailed to the participants for implementation. The researchers added rationales, common questions, potential problems associated with learning relaxation, downloadable audio files, online presentation of the techniques, and attempted to increase adherence by sending the participants weekly report cards. All patients' monitored symptoms, total times using relaxation and problem-solving skills, and self-reported these data via email. Researchers found that phone support did not significantly enhance improvement of the headache index (29% versus 23%) or completion rate (71% versus 65%). Andersson and colleagues (2003) did not replicate earlier gains with only 50% of subjects attaining similar symptom reduction to the first Swedish study. However, they did find that subjects improved on ratings of disability, depression, maladaptive coping and perceived stress.

The third study reviewed is an American study of an Internet based computer-aided psychotherapy for chronic tension or migraine headache (Devineni & Blanchard, 2004). The RCT consisted of a two-week baseline plus four-week Internet protocol and a two-month follow-up. The experimental group received Internet computer-aided psychotherapy consisting of muscle relaxation and cognitive stress management (if tension headache) or autogenic training and biofeedback (if migraine or mixed headache). The control group was a waitlist for four weeks while monitoring and then received the experimental treatment. The study included 139 worldwide adult participants with either chronic tension or

migraine headache for greater than one year duration. Researchers recruited from various websites and web services using Internet ads. The sample consisted of participants from the United States, Canada, Western Europe, and other countries. 65% of participants were lost at the two-month follow-up. The computer-aided psychotherapy was found to have a large effect size of 0.54. The experimental group had a clinically significant (39%) reduction of headache severity. The treatment group also showed improvement on headache and related disability with a 35% reduction in medication use. The study also demonstrated that the computer-aided psychotherapy was more time-efficient than delivering the treatment through face-to-face contact at a clinic.

Buhrman and colleagues (2004) developed an Internet based computer-aided psychotherapy workbook that included guided self-management of chronic back pain by education, applied relaxation, exercise and stretching, activity pacing, cognitive restructuring, generalization and maintenance. Participants were recruited over a period of 18 days using newspaper and Internet ads and then screened from self-reports via the web. 56 chronic back pain sufferers were randomized to either a week of self-monitoring and the computer-aided psychotherapy or a week of self-monitoring and a waitlist. A week after completion participants emailed self-ratings. The study concluded with 51 completers, 22 in the experimental group and 29 in the waitlist. At one week post-treatment both groups had improved similarly on pain ratings with the treatment group showing a greater reduction in catastrophizing scale.

One study reviewed describes the use of a virtual reality system called “Snow World” to distract burn patients from the fire of painful daily dressing to their burns (Hoffman, 2004). This study is awaiting an RCT. However, while addressing the barriers to access for older adults by delivering empirically based treatment via the Internet we must ensure we are not adding barriers inherent in the skills and tools necessary to use an eHealth service.

Overview of Computer Use Amongst Older Adults

Older adults are using computers and the Internet at ever increasing national rates. Range of use for persons between the age of 60-64 years is 56-75%,(American Association of Retired Persons, 2004) and this range is higher than the national average reported for persons over the age of 65 (range of 25-41%; American Association of Retired Persons, 2004). When designing an eHealth service, it is important to consider what level of data, text, media files, and such to provide. A large national survey found that 33% of older adult respondents with computers had access to a high-speed Internet connection (Pew Internet & American Life Project, 2005). Connection speed is an important dictum to consider when developing eHealth services that will be technologically advanced while being easy to download and navigate if a user has a slower download speed. This parameter dictates the quality of graphics and images, downloadable file sizes, and the incorporation of features such as streaming video and audio files. There are pockets of "wired seniors" discussed in other national surveys who have cutting edge technology and access to high-speed Internet connection (Pew Internet & American Life Project, 2005). It may be that

these are the seniors who end up using an eHealth service due to higher level of comfort with the technology and longer periods of time spent online in which they may have higher rates of advertising exposure and higher levels of recruitment. However, the website was designed to be user friendly to those with medium connection speed. Older adults are found to access the Internet from their own home, as well as public settings such as libraries or senior centers (Pew Internet & American Life Project, 2005). If older adults were accessing eHealth services on public domain computers, the intervention modules would need to ensure appropriate content for viewing in a public location. For example, if a user were practicing a relaxation exercise that was being taught by a streaming video would the user be able to use this service in a public location? Perhaps not. When designing an eHealth service, this could be addressed by providing the user with information about the behaviors required and necessary level of privacy in advance of clicking on a treatment module.

National surveys and our past research have found that older adults report not using the Internet due lack of skill or interest and the expense of the service (Adams, Stubbs, & Woods, 2005; Pew Internet & American Life Project, 2005; DiMaggio, Hargittai, Celeste, & Shafer, 2004). When developing effective eHealth services these issues, and issues of page simplicity, user-friendly online help and error message terminology, connection speed, availability of social support, and cognitive ability must be addressed as they explain barriers to use and low levels of satisfaction with Internet services (Adams, Stubbs, & Woods, 2005; Freese, Rivas, & Hargittai, 2006). As website designers we must try to

create personal buy-in with targeted marketing of eHealth services to those with an established need. If an individual is not using the Internet at all, but does have the skills and tools necessary, they may have increased motivation to go online if they were provided with an Internet URL in advance of using the Internet. If an individual was not using the Internet at all, and did not have the skills or tools necessary to do so, this may not be an appropriate way to deliver services to them and alternative bibliotherapy or face-to-face services may be recommended. Lack of computer skill and formidable start-up expense are issues that can be overcome and are being targeted by community and national initiatives. Many such initiatives exist in the form of available training grants, donated equipment, mentorship programs, mobile training facilities, and job training all of which target computer and Internet skill building for new or inexperienced older adults (White, et.al., 1999; Straka & Clark, 2000; White, et.al., 2002; National Institute of Health, 2008; SeniorNet, 2008; Microsoft, 1998). A study on self-management strategies for individuals with type 2 diabetes found that older diabetes patients without previous Internet experience would take part in an Internet based self-management support program if such barriers to participation were addressed (Fell, Glasgow, Boles, & McKay, 2000). Moreover, lack of skill will not be an issue for the next generation of older adults, given that the national rates of computer and Internet use are nearly 67% amongst persons age 50-64 years and 80% for persons aged 30-49 years (Pew Internet & American Life Project, 2005). As these individuals become older adults the demographics will shift and lack of skill and expense will no longer provide such

a barrier to the delivery of eHealth services. Across the US the Internet will continue to be more widely accessible with better quality connections and lower usage costs. Some communities such as Chicago, Houston, San Francisco, Austin, Portland, Philadelphia, New York, and New Orleans have pioneered efforts to have their entire geographic area wired for free or low cost (Settles, 2007; Knowles, 2007; Kopytoff & Kim, 2005). With so many diverse segments of society having an economic stake in computer and Internet use, the barriers of lack of skill and expense will only decline with time. When developing an eHealth service, all efforts should be made to make the service free to the older user. The site should focus on generating income from advertising or third party payers such as insurance companies, grant or government sources.

Extant literature that has found computer and Internet use enhances individual reports of personal control, empowerment, self-efficacy, and life satisfaction (Wright, 2000; Karavidas, Lim, & Katsikas, 2005; Shapira, Barak, & Gal, 2006). It is hopeful that a positive experience using the Internet may be an incentive for older adult users to complete an eHealth intervention. As researchers we must focus our expertise on developing eHealth services that increase the positive Internet experience. This can be done by minimizing or eliminating technological difficulties, such as: pages that do not load properly, out of date hyperlinks, applications that do not run quickly, media files that are too large to load efficiently, minimizing system requirements to enhance speed of service on older operating systems, ensuring minimum operating system

requirements are employed and avoiding any readability issues with large and simple text, buttons, and graphics.

Past research has reported that older adults prefer to read the information on an Internet site directly on their computer, during an active use time that is commonly 30 minutes or less, rather than print it or look at a PDF later (Mercer & O'Donohue, in preparation). This is informative in that any eHealth psychoeducation or bibliotherapy must be provided in a format that is easy to read on a computer screen and doesn't require much vertical or any horizontal scrolling. Also, the information in each module should take no more than 30 minutes to read or complete.

Given that older adult users report accessing health-related information on a specific disease as their most important health-related Internet activity, above looking at treatment options or pharmaceutical services, eHealth services may best advertise and recruit participants from Internet sites that currently provide general information on specific diseases. For example, eHealth focused on chronic pain treatment may best advertise or recruit users from existing Internet sites focused on persistent pain, cancer, fibromyalgia, and arthritis. When older adults are asked about treating psychological and behavioral health problems over the Internet they report less comfort accessing psychological services than medical services over the Internet. In order to increase the acceptability and face validity of an eHealth services rooted in psychological treatments, such services must emphasize their health psychology and behavioral health backgrounds. If eHealth services are medical in appearance and language they may be deemed

more appropriate than heavily psychological services. The further concern reported by older users is that of confidentiality of the Internet service.

Confidentiality must be addressed by any eHealth service on the front end and reiterated throughout a website. This can be achieved with novel methods including stating the function of signing in and out near the area of the website where the sign in button is and clarifying what happens to the information users are entering into fillable fields. For example, a pop-up box could appear when the mouse scrolled over the sign in button that said “Sign-in and keep your information confidential.”

Website Design Heuristics. Extant research has found that if a web-page is transparent, comprehensive, responsive, self-explanatory, adaptive, efficient, forgiving, flexible, informative and timely, and consistent with the user’s other familiar designs this helps to breakdown any psychological barriers present or perceived to be present by older adults (AARP, 2008; Adams, Stubbs, & Woods, 2005). Websites should be simple in their construction with no overlap, complicated text, shadow or outlines, they should use only simple clear text that is well delineated from the background, images and graphics should be age appropriate and incorporate images of older adults themselves. The colors used should be from a warm palette but should not cause difficulty with reading text or finding the navigation buttons. It seems that a website’s ability to invite exploration and create interest by older adult users is established when designers follow these heuristics. Future eHealth services should incorporate these heuristics when targeting services to older adults.

Overview of the Public Health Problem

Chronic pain is a growing public health burden (Morlin, et al., 2008) as demonstrated by the strain it puts on the healthcare system and the economy as it reduces a patient's quality of life and ability to work (Blyth, March, Brnabic, & Cousins, 2004; McDermott, Toelle, Rowbotham, Schaefer, & Dukes, 2006). Chronic pain is a significant cause of worker absenteeism (VonKorff & LeResche, 2005; Dunn, & Croft, 2004) and high rates of healthcare utilization (Elliott, Smith, Penny, Smith, & Chambers, 1999). Continuing to focus resources on individualized face-to-face treatment ensures that older adults may continue to be under-treated (Robinson, 2007; Landi, Onder, Cesari, et al., 2001; Won, Lapane, Gambassi, et al., 1999; Sengstaken & King, 1993). Furthermore, extant literature has found that advancing age, frailty, and belonging to an ethnic minority group increases the risk for under-treatment (Won, Lapane, Gambassi, et al., 1999; Green, Anderson, Baker, et al., 2003). If we do not attempt to deliver treatment in a more cost-effective, easily disseminable, and socially valid way the deleterious effect of chronic pain will continue to be most pronounced among the socioeconomically disadvantaged ethnic and racial minority populations (Ng, Dimsdale, Shragg, & Deutsch, 1996; Green, Baker, & Ndao-Brumblay, 2004; Nguyen, Ugarte, Fuller, et al., 2005; Baldwin, Humbles, Armmer, & Cramer, 2001). Self-management programs delivered in outpatient settings, preferably an older adult's community dwelling, contain the largest amount of promise to answer the impending public health crisis. Typically self-help programs include some combination of 1) education about pain and its

consequences; 2) relaxation skills training; 3) cognitive coping skills training; 4) problem solving; and 5) communication skills training (Reid, Papaleontiou, Ong, Breckman, Wethington, & Pillemer, 2008). Self-management programs are usually offered in community settings such as churches/synagogues, schools, or senior centers. Offering treatment in these outpatient community settings has been found to reduce transportation barriers, prohibitive costs, and decrease stigma (Reid, et al., 2008).

One helpful part of the public health solution that addresses the above barriers is the delivery of empirically supported nonpharmacologic interventions through alternative technologically driven interventions. These modalities include self-directed interventions (workbook, audio-tape, CD-Rom), telehealth, and eHealth initiatives. Currently there are few interventions delivered to older adults via these technological advanced venues and there is little data available on whether they are appropriate for the older consumer (Czaja, Charness, Fisk, et al., 2006; Fozard, Rietsema, Bouma, Graafmans, 2000). Internet audience measurement and analysis has found that older adults are amongst the fastest growing age group online. Older adult (60 years plus) Internet surfers surged 25% from 2002 to 2003, accounting for seven percent of the active Internet community (Heineman & Kim, 2003). Internet-based interventions for chronic illness generally show improvement in functional behavior change outcomes (Wantland, Portillo, Holzemer, Slaughter, & McGhee, 2004). These interventions can be as a stand-alone self-management program mentioned previously or they can be used as an adjunctive treatment as a component of a stepped-care model

of healthcare delivery. Adjunctive web-based programs may be beneficial in delivering the education, skills, and coping techniques that can easily be learned without face-to-face assistance. However, if an older adult requires more physical care, has confounding health issues, or is unwilling to try new pain management techniques in fear of harming themselves a face-to-face intervention may be supplemented as deemed appropriate by the therapist.

Research has established that it is essential older adults are involved in defining the technology that is theoretically aimed at addressing their needs (Fozard, et.al., 2000). In a needs assessment study conducted by the researchers it was discovered that many older adults are coping with high levels of persistent pain and report not receiving appropriate care for their pain or express low levels of satisfaction with their current treatment (Mercer & O'Donohue, in preparation). Older adults often report not seeking treatment because they believe their pain is not bad enough or is an unavoidable symptom of aging (Mercer & O'Donohue, in preparation). Neither of these assumptions are factual and there are numerous psychological and medical interventions that offer older adults coping with persistent pain improved quality of life. However, many older adults are unable to access quality empirically supported treatments because of various psychological and systematic barriers. Such barriers are elegantly addressed by offering services over the Internet in the form of eHealth initiatives. There is documented interest in eHealth services as demonstrated by the 85% of older adults' in the authors' past research whom reported being interested in accessing medical or medical support services through the Internet

(Mercer & O'Donohue, in preparation). Such services are not readily available and the researchers have developed www.treatyourpain.com to meet this need. Researchers specializing in service provision to older adults have developed heuristics to guide the development of websites for older adults. The researcher's past needs assessment study confirmed that eHealth services developed using appropriate heuristics meet approval and motivate exploration by older adults. By incorporating these heuristics into the design of www.treatyourpain.com, the researchers aimed to develop an age appropriate eHealth service that provides a possible solution to the mounting health concerns of the increasing population of older adults. Piloting this website will explore the acceptability and satisfaction of such a service and will explore whether eHealth services can improve functioning and coping on various mental health domains. With further research and development such eHealth services may ultimately decrease health care expense and improve service utilization.

Critical Analysis and Discussion

Study Design. To date, researchers interested in evaluating chronic pain in older adults have focused the majority of their attention on conducting randomized controlled efficacy trials. The National Institute of Health's stage model of behavioral treatment development research characterizes this design approach as consistent with the procedures of Stage 2 research (McNamara et al., 2002; Rounsaville, Carrol, & Onken, 2001). To date, researchers interested in chronic pain in older adults have paid little attention to the goals and procedures of Stage 1 research as outlined by Hayes, Barlow, and Nelson-Gray

(1999) and Rounsaville, Carroll, and Onken (2001, pg. 136). Namely, research has failed to attend to: 1) program development; 2) evaluation of new approaches via pilot or feasibility trials; and 3) evaluation of participant acceptance. By adhering to the Stage 1 model of treatment development research, investigators may reduce service attrition and improve the efficacy of existing treatment approaches.

Due to this methodological limitation, the literature on chronic pain in older adults appears fragmented, with insufficient attention to evaluating clinical theory and hypothesized mechanisms of therapeutic change. For example, studies commonly describe the provision of multicomponent, behavioral interventions that may include activity engagement, pacing, cognitive restructuring, problem-solving skills training, and general relaxation skills. However, without hypotheses identifying the specific treatment components (e.g., catastrophizing) that account for the majority of the variance in positive health outcomes, or measurement of process variables (e.g., knowledge acquisition) that demonstrate the degree to which hypothesized active ingredients have been instantiated, the consumer cannot discern the nature of the relationship between these components and successful pain management. Researchers interested in developing effective treatment programs may benefit from adopting hypothesis driven approaches and measuring process variables. Furthermore, attending to modifiable variables related to positive short- and long-term treatment outcomes, namely differences in motivation and relapse prevention skill repertoires, may improve our ability to address a primary goal of Stage 1 research; “to understand behavioral change

processes as well as develop interventions to promote positive change processes” (Rounsaville, et al., 2001, pg. 133-134).

Scalability and Dissemination. Experts continue to struggle to develop effective strategies to treat chronic pain in older adults because of the heavy reliance on treatment approaches that are incongruent with the scope of the problem. Individual treatment approaches cannot alone effectively combat the rising prevalence of chronic pain in older adults. Few investigators have examined the potential clinical and economic benefits of adopting a stepped care approach, including self-help, minimal-therapist-contact, and eHealth. Future studies must examine the multiple layers of efficient and accessible treatment approaches possible in a stepped care model (Bower, 2005). Stepped care models aim to maximize the effectiveness and efficiency of the allocation of treatment resources (Haaga, 2000). Stepped care models may be successful at bridging the gap between the current demand for effective chronic pain treatments and the existing minimal supply.

The field would benefit from research investigating the clinical effectiveness and social validity of low-cost, accessible, and efficient stepped care approaches. A few progressive researchers, discussed earlier in detail, are already addressing this notion (e.g., Strom, Pettersson, & Andersson, 2000; Devineni, & Blanchard, 2004). For example, Strom, Pettersson, & Andersson (2000) have shown that Internet-based behavioral treatment for headaches in adults produces superior outcomes to a waitlist control. The researchers also concluded a cost-efficiency of 12 times greater than treatment as usual as a

factor of therapist time. Treatments adopting a stepped care approach may reduce costs and increase access to effective pain management treatments. Chronic pain research must begin to look beyond efficacy and consider the criticism that existing programs have not yet been widely disseminated outside of specialized individual practitioners or multidisciplinary clinics (Turk & Melzack, 2002). Treatment approaches that increase the magnitude of older adults who can be successfully treated in a cost-effective manner will surely be welcomed as viable means for addressing the current epidemic.

Social Validity and Quality Improvement. Due to the heavy emphasis placed on Stage 2 research, evaluations of chronic pain treatments have failed to address the important Stage 1 research goal of evaluating participant acceptance of a given treatment approach. Considering issues of social validity may be particularly important as low perceived quality of care has been associated with increased attrition rates, even when the effects of demographic and health parameters are statistically controlled (Czaja, Charness, Fisk, et al., 2006; Kerns, Otis, Rosenberg, & Reid, 2003). Given their limited resources, older adults and healthcare providers may also view cost-effective, individualized approaches as more acceptable than existing treatment models. Examining social validity may provide a greater understanding of factors associated with participant retention and may promote the efficient and economical provision of effective care.

Together, the adoption of several methodological advances could significantly strengthen the extant literature. Future research may benefit from considering: 1) inclusion of diverse samples; 2) measurement of process

variables to see the extent to which hypothesized active ingredients have been instantiated; 3) lower-cost, self-help, minimal-therapist-contact, and eHealth approaches to treatment; and 4) measurement of participant acceptance and satisfaction. The question is whether adoption of these components will promote increased access, reductions in cost, increases in participant retention, improvements in treatment adherence, reductions in relapse rates, and increases in short- and long-term efficacy.

Chapter 2

The Present Study

Purpose

The purpose of this study was to conduct a Stage 1 feasibility pilot of www.treatyourpain.com; an interactive, empirically based program aimed at decreasing pain and pain related suffering in older adults and edifying the development of future RCTs. The goals of this pilot trial are to demonstrate: a) patient acceptance of the new treatment, b) our ability to recruit sufficient number of older adults on the Internet, c) feasibility of treatment delivery on the Internet as measured by retention rates and treatment satisfaction data, d) clinically significant patient improvement over the course of treatment in reports of pain related health status, coping skill acquisition, and health promoting behaviors, e) conduct a power analysis to determine the required sample size for any future RCT, and f) incremental cost effectiveness ratio as measured by difference in cost of treatments/difference in % improvement. This treatment model addresses individual deficits in: 1) pain education; 2) physiological tension-

reduction techniques; 3) positive coping strategies; 4) utilizing social support; 5) reducing or eliminating pain behaviors; and 6) relapse prevention skills in the service of promotion of skill acquisition, adherence, and long-term health behavior change. This program aims to promote increased access to empirically based care by adopting an Internet-based approach that addresses scalability, cost, and dissemination.

Rationale

The rationale for the proposed study is founded in the expectation that using an innovative delivery method of an established empirically based pain treatment program will maximize treatment satisfaction, utilization, and psychological health amongst older adults coping with persistent pain. The present study aims to address limitation of extant research by: 1) adopting a theory driven approach; 3) addressing individual differences in modifiable skill repertoires rather than relying on the identification of proxy variables; 4) addressing scalability and dissemination issues; and 5) evaluating social validity.

Current pain management treatment is usually delivered via face-to-face therapy from specialists. Many older adults in need are reportedly unable or unwilling to access such specialized services due to barriers including: economic constraints, problems with accessibility, lack of knowledge of treatment options, and lack of providers in a geographic area. (Czaja, Charness, Fisk, et al., 2006; Kerns, Otis, Rosenberg, & Reid, 2003; Mercer & O'Donoue, in progress). eHealth services have been able to address these barriers in other pain populations with demonstrable success (Marks, Cavanagh, & Gega, 2007). It is

the researcher's belief that if such eHealth services are developed in accordance with heuristics specifying eHealth parameters for older adults they may offer these empirically based strategies to a larger number of older adults with a greater level of treatment satisfaction. Therefore, the researchers hypothesized that www.treatyourpain.com would be able to recruit and retain participants while reducing their pain related suffering with greater treatment satisfaction than an attention-based information only control.

The present study has four main aims consistent with the goals and procedures of Stage 1 behavioral treatment development research (McNamara et al., 2002; Rounsaville, Carroll, & Onken, 2001). Aim 1 is to develop the www.treatyourpain.com Internet treatment program. Aim 2 is to evaluate hypothesized mechanisms of change by examining the extent to which the intervention enhances individual coping skill acquisition and health promoting behavior. Aim 3 is to evaluate the degree to which this program promotes improvements in overall pain related health status. Lastly, Aim 4 includes the assessment of participant acceptance of the present treatment. To this end, we will employ a randomized controlled feasibility trial design.

Hypotheses

Hypothesis 1: At post-test, participants in the www.treatyourpain.com experimental condition would demonstrate improved health status as evidenced by:

- Lower ratings on the Multidimensional Pain Inventory subscales (See Measures);

- Higher ratings on the General Health Questionnaire (See Measures);

Hypothesis 2: At post-test, participants in the www.treatyourpain.com experimental condition would demonstrate improved coping skill acquisition and increased health promoting behaviors as evidenced by:

- Higher ratings on subscales of Coping Strategies Questionnaire (See Measures);
- Higher ratings on the support subscale of the Multidimensional Pain Inventory (See Measures);
- Lower ratings on Geriatric Pain Measure (See Measures);
- Lower rates of over-the-counter and prescription pain medication use (See Measures).

Hypothesis 3: At post-test, participants in the www.treatyourpain.com experimental condition would demonstrate high levels of treatment satisfaction as evidenced by higher scores on the Client Satisfaction Questionnaire (See Measures) than participants in the control condition. Participants in the experimental condition would report high levels of mastery of material and acceptability of the treatment modules (See Measures) throughout the intervention.

Chapter 3

Method

Participants

Sample Size: The enrollment for this study was $n=30$. The sample size was appropriate for the goals of Stage I feasibility pilot research as recommended by Rounsaville, Carroll, and Onken (2001). Participant population was composed of adult volunteers.

Inclusion/Exclusion: Participants in this study were (1) at least 60 years of age or older; (2) English-speaking; and (3) reported experiencing pain for three months or longer. There were no other inclusion or exclusion criteria.

Recruitment Process: Student researcher, Victoria Mercer, M.A., recruited all participants. Participants were recruited through advertisement on the Internet search engine Google. The media advertisement stated, "Researchers at University of Nevada, Reno are looking at a new way for individuals age 60 and older to learn more about managing chronic and persistent pain in the comfort of their own homes."

Overview Design and Procedure

Consistent with the goals and procedures of Stage 1 behavioral treatment development research, as outlined by Rounsaville, Carroll, and Onken (2001) and McNamara and colleagues (2002), the www.treatyourpain.com program was evaluated via a randomized, controlled feasibility trial. Thirty-eligible individuals were randomly assigned to one of two groups: 1) the Experimental www.treatyourpain.com Internet Treatment group, or 2) the National Pain Foundations website education-only control, resulting in 15 adult participants per cell. The control condition was selected based on the biopsychosocial nature of the empirically based information on pain, treatment, and resources delivered via

a free Internet service. The website offered more comprehensive content and information than many other pain organizations that also provided free Internet information. Furthermore, the control condition abided by the design heuristics required to be considered user friendly for older adults. These criteria allowed the researcher's to explore how the experimental condition performed in terms of efficacy and acceptability when compared to the gold standard of pain information services currently available at no cost to older adult pain sufferers on the Internet. It was not necessary to have a stricter match of content or layout in order to meet the initial goals of Stage 1 research. The content of both conditions are detailed beginning on page 40 of this manuscript. Participants in both groups received instructions to review program materials independently for at least 1.5 hours per week for 6 weeks. Both groups received general psychoeducation regarding the prevalence of persistent pain amongst older adults and information on the strategies that exist to better manage pain. Additionally, individuals in the www.treatyourpain.com condition received individually tailored, behavioral pain management skills. Participants had all treatment modules available every week, however, rather than being forced to go through the modules in a pre-set order participants were able to select which modules to complete in which order based on their self-determined need.

Given the goals and procedures of Stage 1 treatment development research, we acknowledged a priori that this design might not provide adequate statistical power to evaluate statistical significance of our findings or draw causal inferences. However, the randomized feasibility trial design was selected as it

would enable us to gain valuable information regarding: 1) attrition; 2) hypothesized mechanism of change; 3) progress toward clinical efficacy; and 4) participant acceptance (Rounsaville, et al., 2001). Additionally, the feasibility trial design allows examination of the strengths and limitations of treatment delivery via the Internet.

In order to address the Stage 1 research aims as explicated above, the investigators adhered to the following procedure:

- AIM 1: Treatment Development. In order to develop an Internet based eHealth tool that offered empirically based pain management reduction strategies tailored to the specific needs and repertoires of older adults the researchers culled program components from leading resources. Based on the available literature and clinical sources www.treatyourpain.com was developed to consist of six different treatment modules (Hadjistavropoulos & Hadjistavropoulos, 2008; Lewandowski, 2001; Rudy, Hanlon, & Markham, 2002). The intervention included the following six modules: Starting New Treatment, Pain Education for Older Adults, Taking Control of the Effects of Pain, Reducing Emotional Pain and Suffering, Improving Your Functioning While Living with Chronic Pain, and Building Your Pain Community. Content of the specific modules is further detailed on page 42 of this manuscript. Overall, the intervention consisted of multiple behavioral and cognitive components. The intervention embraced the recommended “supermarket” approach to therapy, where participants are consumers of health information and may tailor the intervention to best suit their needs and treatment goals

(Morley & Williams, 2002). Extant research has not been able to conduct decisive dismantling research on multi-component pain treatment programs, nor has research concluded whether treatment should be matched to the individual patient based on aptitudes or other profiles (Morley & Williams, 2002). While functional behavior analysis may permit the most thorough and effective individual pain treatment program (Bradey & McKendree-Smith, 2001; Rogers & Gwinn, 2002), such an analysis is not cost-effective nor possible using an eHealth approach. Therefore, we attempted to provide the framework for such an analysis to be built into the structure of a behavioral intervention tool. Motivational interviewing principles were interjected throughout the introductory starting new treatment module. Operant theory guided the pain education and improving functioning modules. Cognitive-behavioral theory and mindfulness strategies dictated the material and skills in the emotional pain and suffering module. Social skills were taught, modeled through examples, and discussed in the community module. Relapse prevention skills were presented at the conclusion of the intervention and include components of problem-solving and motivational techniques. The intervention attempted to take the best, most effective components from existing behavioral pain treatment strategies and deliver them using innovative eHealth technology.

- AIM 2: Evaluation of Hypothesized Mechanisms of Change. In order to evaluate the extent to which the hypothesized mechanisms of change were instantiated, we assessed the degree to which participants demonstrated

gains in the following dependent variables: 1) coping skill acquisition and 2) health promoting behavior. The Coping Strategies Questionnaire and Geriatric Pain Measure (See Measures) were administered at baseline and a 6-week follow-up to assess skill and healthy behavior acquisition (e.g., coping and functional activity). We interpreted differences in these dependent variables in the context of observed changes in subjective measures of health status (See AIM 3).

- AIM 3: Evaluation of Progress toward Efficacy. We used reductions in self-reported pain intensity, reduced pain related interference, pain associated affective distress, loss of control, changes in social support, disengagement due to pain and pain with ambulation, and medication consumption (Multidimensional Pain Inventory and Geriatric Pain Measure; see Measures) and improvements in self-reported psychological well being (General Health Questionnaire; see Measures) to evaluate progress toward efficacy. These assessments were conducted at baseline and at the 6-week follow-up. As statistical power was expected to be insufficient to detect statistically significant differences and the assessment period too brief to detect clinically significant change, we planned to use Time x Group interactions in the expected directions to provide preliminary support for the efficacy of this intervention.
- AIM 4: Evaluate Participant Acceptance of New Treatment. Evaluation of participant satisfaction is an important goal of Stage 1 research. Assessments of social validity will provide valuable information about the

ability of this intervention to reduce the risk of service attrition and its ability to serve as a disseminating treatment approach. For individuals in the experimental condition, at the completion of each treatment module, we evaluated participant competency with three review questions, and the degree to which they felt each module was engaging, acceptable, and effective on a 4-point Likert scale. Participants in both conditions also reported their overall satisfaction with treatment at the conclusion of participation via the eight-item Client Satisfaction Questionnaire (See Measures).

Current Study Design and Intervention Content

The current study was a between groups repeated measures experimental design, randomizing participants between a control condition and experimental condition. Following recruitment, study orientation and agreeing to a waiver of signed consent, baseline assessments were gathered and participants were randomized evenly between the control condition and the www.treatyourpain.com experimental condition. Following six weeks of access to the intervention the participant's completed all post-test assessments.

Participants randomized to the control condition accessed the webpage published by the National Pain Foundation (NPF). As previously mentioned this service was selected to serve as the control condition for this study based on the following criteria: empirically based content, design heuristics appropriate for older adults, premier example of no-fee pain intervention tool available on the Internet for older adults. Via instructions housed within the

www.treatyourpain.com's iFrame window (a screen shot of how this looked is shown in Appendix B), after log-in participants were encouraged to review the website's material and to make behavior changes consistent with NPF's recommendations. The NPF website included base pages on diseases and conditions associated with pain, living with pain, tools to cope with pain, community information, news about pain, and information on providers. The homepage included information on what was new in the research on pain, highlighted links to different areas within the website that were of common interest, a link to a personalized pain journal, a link to a blog posting by members, and links to YouTube videos on pain by National Pain Foundation members. The diseases and conditions page included information on cancer pain, complex regional pain syndrome, diabetic neuropathy, fibromyalgia, headache, neuropathic pain, orofacial pain, pelvic pain, postherpetic neuralgia, and thoracic outlet syndrome. When a participant clicked on a specific type of pain more information was given, including; how to understand the pain, find help in one's community, information on common treatments, facts and statistics, myths, resources and a glossary of terms. The living page included menu options to find more information on addiction, alternative and complementary therapies, caregiving, choosing your medical provider, coping, disaster preparedness, articles about disease, disparities in pain treatment, exercise and diet, family issues, helpful links and resources, insurance and finance issues, insurance, medications, pain and mental health, seniors and pain, sleep issues, spiritual issues, and wellness. The wellness page included links to using the

personal pain journal, YouTube videos, and links to webpages to find a pain care provider. The community page included links to the same pain journal, pain care providers, the website blog, YouTube videos about pain, and links to pain support groups. The news page listed recently published papers or news stories about pain. The providers' page linked to an online referral resource for providers who had registered with the National Pain Foundation's website as specialists who worked with pain.

Participants randomized to the experimental condition received empirically supported psychological pain management information and services provided by www.treatyourpain.com (in part the technologies were adapted from resources provided in Hadjistavropoulos & Hadjistavropoulos, 2008; Lewandowski, 2007; Weiner, Herr, & Rudy, 2002). The information was structured into six different modules and the content of each module will be described below; a screen shot of part of each module is provided in Appendix B. The first module participants were routed to was the "Starting New Treatment Module" that included an introduction to the treatment service and education about common experiences for new users of psychological treatment; this module incorporated different motivational interviewing components to increase participant willingness and commitment to change their pain related behaviors. Information on readiness to change was provided, participants were recommended to use a worksheet to explore the negative impact of chronic pain in their life, and they were also introduced to some of the behavioral skills that would help them address those behaviors within the different modules (e.g., self-monitoring, cognitive

modification, increased activity). The proposed stages of change: 1) expecting a cure; 2) not even ready to think about changing; 3) open to thinking about changing, but...; 4) believing change is possible; and 5) ready to make changes, were listed and explained in detail. Participants were encouraged to identify which stage they were currently in by reading different pain related statements from each stage and either agreeing or disagreeing with them. Worksheets on the positive effects of changing their pain related behavior and on goal setting were also provided and incorporated in the different sections of the module. The skills and behaviors necessary to monitor their pain related behaviors were provided, along with education of the importance and therapeutic effect of monitoring as a tool to change their behavior. A pain diary card, referred to throughout each module and provided by link on the upper right hand corner of every screen, was introduced and instructions for using the tool were provided. Lastly, this introductory module included a segment on the importance of understanding one's pain diagnosis. A worksheet on gaining clarity about how participants, their family, and their physicians understood their pain was provided with instruction. Following completion of the introductory module participants answered four questions about their pain management needs and selected which area they needed help with addressing first; they were able to tailor the intervention by using these questions to move throughout the intervention rather than being forced to move through the modules in a set order.

The "Pain Education for Older Adults Module" focused on increasing participant's education on the role of psychology in chronic pain treatment, the

biopsychosocial model of pain, the role of antecedent and consequent factors on pain, epidemiologic data on chronic pain amongst older adults, and common misperceptions about pain. Operant theory largely guided the material in this module. The module began by providing an empirically supported definition of what chronic pain is, a brief video was provided to deliver the information in a different format. Information on pain in older adults was provided as means to dispel myths and misconceptions held by pain sufferers themselves that might act as barriers to change. This information was used to modify the participants' worksheets where they had listed the negative effects of pain and positive impact of changing their behavior. Knowledge quizzes were provided assessing the participant's endorsement of various pain myths as a method of facilitating cognitive change. As a means of educating participants on the biopsychosocial model of pain, a worksheet called "my unique pain profile" (it looked like a pie chart) was used to guide users through the process of figuring out how the different biological, psychological, and social components came together to compose their own pain profile. In order to best manage their pain and change their behavior, education on the value of understanding the weight and interaction amongst these factors was provided.

The "Taking Control of the Effects of Pain on Your Life Module" focused on increasing participants' acquisition of effective coping skills. Education on the value of instantiating relaxation exercises as a coping tool was provided through written information and multi-media components. Relaxation exercises included calm breathing and progressive muscle relaxation. A five-minute video

instructing the participant on how to use breathing to reduce muscle tension, links to longer exercises were provided in the resource section. A ten-minute audio file was provided that guided participants on calm breathing, as well as a PDF handout providing written instructions. Diaphragmatic breathing was also described and provided by video instruction. To promote willingness to change, information on pain behaviors was provided in a supportive and non-punitive way. A worksheet on identifying one's pain behaviors was provided and users were encouraged to ask themselves various questions about how they respond to pain and communicate pain to their family, friends, and medical community. Following completion of the worksheet, participants were encouraged to assess whether pain behaviors were negatively impacting their ability to manage their pain and then provided with a number of cognitive and behavioral ways (e.g., reinforcing alternative behaviors, communication training, increased awareness of pain behaviors and triggers) to reduce their display of pain behaviors. Education was provided on the concept of pacing and a worksheet was used to help participants identify their activity patterns and modify them to promote higher levels of activity and engagement. Information on cognitive restructuring was provided to address the psychological component on participant's pain profile. Self-monitoring of cognitions was conducted using a cognitive diary card and five-way thought evaluation form. Participants were coached on the techniques required to challenge their negative pain beliefs and incorporate more realistic and helpful thoughts into their repertoire using a realistic thinking worksheet. Education on frequent maladaptive ideas about pain and how those ideas might

act as barriers to change was provided. This included specific information on: 1) catastrophizing and how to use the thought evaluation form to address it; 2) fear of reinjury and how to design and implement behavioral experiments to challenge the validity of the fear; 3) expectation of a cure and how to balance maintaining hope with acceptance of one's situation in order to promote valued living; 4) entitlement, frustration, and anger and how focusing on these thoughts or ideas act as barriers to change and reduce the implementation of health related behaviors; 5) self-blame and how shifting from self-talk about what one should do to testing the evidence of the validity of an idea can promote more useful ideas about pain; 6) future despair and the value of disentangling unhappiness from pain and shifting attention intentionally to happy moments and pleasant events/activities; and lastly, 7) how the idea of social disbelief educates the participant on the common experience of having an "invisible" syndrome and how to increase the validation from a participant's environment without increasing dysfunctional pain behaviors.

The "Reducing Your Emotional Pain and Suffering Module" included a significant amount of psychoeducation on emotion and psychological distress, as well as empirically supported techniques to reduce anxiety and depression. Specifically, education on the relationship between chronic pain and emotion or moods was provided in an effort to increase participants' knowledge of the connection and interplay (ABCs of behavior) between different parts of their unique pain profile. Depression was addressed judiciously, with deliberate attention paid to providing resources for immediate help if a participant was

experiencing possible depression or any thoughts of harming themselves. The DSM-IV-TR symptoms/signs of depression were reviewed and the concept of how various items relate to self-esteem and or thoughts and boredom were provided. The utility of behavioral activation through implementation of pleasant events was described and a worksheet was provided to coach participants' on how to increase their engagement in pleasant events. An educational primer was provided on common psychological treatments for depression, as well links to where they were addressed in the different treatment modules. These treatments included: 1) increased physical activity; 2) relaxation; 3) cognitive behavioral therapy; 4) antidepressant medication; 5) goal setting; 6) communication and assertiveness skills training; 7) social involvement; and 8) pleasant events. The role of anxiety was discussed and information provided on how anxiety can increase one's pain related suffering. A worksheet on realistic thinking was provided in an effort to reduce/eliminate the cognitive beliefs contributing to a participant's pain related anxiety. Participants were encouraged to use relaxation skills, including calm breathing and progressive muscle relaxation, to reduce the iatrogenic effects of tension on pain. The user was also provided with a handout on tips for healthy living that talked about how to ensure one's diet, exercise, and sleep habits all functioned to best reduce anxiety. Lastly, particularly important to the older adult pain sufferer, the impact of social support and loneliness on mood was described. Specific guidelines were provided to increase participant's social interactions, this included coaching on

how to find and foster relationships, make small talk, address negative thinking, and use pacing to increase one's social network.

The "Improving Your Functioning While Living with Chronic Pain Module" included education and coaching on how to improve energy, exercise, sleep, and nutrition as they relate to pain. An overview of fatigue and energy was used as a springboard to specific information on the value of exercise for older adults living with chronic pain. The benefits of regular safe exercise on physical and emotional wellbeing were provided. Strategies and guidelines were provided to increase the chance that if a participant did increase their physical activity the experience would be enjoyable and promote repetition. The general guidelines included information on: 1) getting ready: when, where, what to wear, and other considerations; 2) tips for exercising; 3) knowing the warning signs to stop; and the 4) components of a comprehensive fitness routine. Participants were coached to consult a professional to ensure that their exercise program was safe and included appropriate variety and intensity. Tips on how to maximize participants' functioning and energy were provided for each of the following main areas of functioning: resting/sleeping environment, dressing, bathroom hygiene, kitchen setup, cleaning the house, shopping, and leisure time in the home. General guidelines for occupational strategies and environmental hints to reduce strain were provided. A tutorial was developed on sleep hygiene, including a worksheet, which guided participants on assessing their sleep environment and patterns, and then suggestions were made about how to change their behavior and or environment to maximize the chance of a good night's sleep. Similarly,

guidelines on healthy nutrition were provided in an effort to inform participants on the benefits of keeping a healthy body weight on best managing their pain. Additionally, a list of foods associated with increased pain or decreased functioning was provided (e.g., caffeine, alcohol, MSG, aspartame, chocolate, red wine, aged cheese, and preservatives). Participants' were reminded throughout this module that if they were going to make any of the recommended changes, to start very slowly, start only one thing at a time, and see how it went before changing anything else. Additionally, the participant's were always recommended to discuss changes to their routine or concerns with their medical provider.

The "Building Your Pain Community Module" included problem solving techniques, communication strategies, relapse prevention techniques, and education about navigating the medical system. Firstly, education was provided on how best to work with a participant's medical provider. Participants were provided with a doctor's visit guide worksheet, which included guidelines on what to do and how to prepare before an appointment, at the appointment, and after the appointment, as well as frequently asked medical questions about one's condition, treatment options, medical tests, referrals, and medication. The handout also included a checklist to ensure that participant's knew to make sure their doctor understood the location, intensity, duration, frequency of their pain, triggers, coping strategies, as well as any medications and or treatments tried by the participant and the outcomes. Rather than making any recommendations for medication change, which would have been inappropriate given the minimal-

contact design of the intervention; information was instead provided about the role of medication, common types of medications used to treat pain, and the safe use of pain medications in general. A medication diary, published by the American Geriatrics Society, was provided to aid in the participant's communication about their medication to members of their medical community.

Following completion of all of the previous modules, participants reviewed material on maintaining their progress following termination of the study. A worksheet on maintaining progress was provided that described basic relapse prevention skills. Specifically, several tips were provided to the participant on how to avoid falling into less effective, habitual, patterns of behavior. The tips were as follows: Tip 1) the importance practice; Tip 2) knowing one's red flags for slipping into old patterns; Tip 3) the importance of coming up with new challenges to ensure generalization of a new skill; Tip 4) the need to treat lapses as learning opportunities; Tip 5) the need to know the facts and base rates of relapse; Tip 6) the importance of being kind to oneself and normalizing any relapse; and Tip 7) the value and importance of rewarding oneself for one's success. The "Resources" page included a list of all the modules and the PDF handouts, worksheets, and media files provided within each one. Different web-based and self-help services were also listed with hyperlinks. For ease of use, this page was available throughout the six weeks of website access.

Technical details of eHealth tool: the proposed website was accessed by two different kinds of users: 1) the administrator who managed the content and database (i.e., primary investigator Victoria Mercer, M.A.); and 2) older adults

who experience chronic pain. The PI did not communicate to participants via mass e-mail, for fear of breaching confidentiality (i.e., inadvertently sending out a message intended for one individual, to the group). To regulate access to the site, new users had to register in a registration module. This module enabled users to subsequently log on to the website at any time for six weeks. Once registered, users accessed the treatment through an authentication module. This module checked the “authenticity” of users attempting to access the website (i.e., did the user have a valid user name and password combination?). If the username was correct, but a participant forgot their password, they were emailed a new one. Upon first sign-in, users completed all baseline assessments online. The data was sent to a secure server without any personal health identifying information; it was maintained with the participant’s created username. Following completion of the assessments, the individuals were randomized to one of the two groups. The secure database tracked the number of times they accessed the site, and the additional competency and acceptance information from each module.

In accordance with the heuristics defined to help breakdown psychological barriers present or perceived to be present by older adults when using Internet technology, we developed the website to be user-friendly for older adults (AARP, 2008; Adams, Stubbs, & Woods, 2005). www.treatyourpain.com ensured that it was transparent, comprehensive, responsive, self-explanatory, adaptive, efficient, forgiving, flexible, informative and timely, and consistent with the user’s other familiar designs. The website was simple in its construction with no visual

overlap, complicated text, shadow or outlines, and the sans serif font was size 14 and well delineated from the background, images and graphics. The images were age appropriate and incorporated images of older adults themselves. The colors used were from a warm palette but did not cause difficulty with reading text or finding the navigation buttons. We maintain 3 panels on each page, except the resource and welcome screens, to keep the navigation bar and side panel consistent ensuring that the user was able to navigate throughout the website without experiencing confusion or frustration. We tested the website in different browsers to ensure that users did not have to use any horizontal scrolling and needed to use little vertical scrolling to access the information contained in each page. Each module contained one lengthy page, made easy to navigate with a linked menu at the top of the page that connected to page segments. At the conclusion of each module, the user clicked on a “I’m done this module, what’s next screen?” which prompted a pop-up window with review questions, acceptability questions, and the menu for additional modules. We maintained the website throughout the study to ensure that all hyperlinks and buttons were responsive and did what they were supposed to do.

Procedures

Step 1: Brief Study Orientation and Eligibility Screen (approximately 15 minutes).

- A. Provision of brief study orientation via the Internet;
- B. Determination if inclusion criteria are met;
- C. Invitation to participate in research study.

Potential participants traveled to the website www.treatyournpain.com from directed searching or in response to one of the media advertisements posted on the premier search engine Google to recruit participants. At the website homepage they read a brief description of the study and reviewed the self-directed screening questions. During screening, in which the participant responses were not stored, potential participants were asked if they were 60 years of age or older, if they had unresolved pain for three months or longer, and if they were able to read and write in English. If the participant responded "yes" to these questions they were told they were invited to participate in a pilot-investigation of an Internet-based adaptation of empirically-based pain management strategies, which may produce changes in pain levels or pain related suffering. If potential participants were interested they clicked on a button asking for more information, if not interested they were routed out of the site.

Step 2: Study Orientation and Consent (approximately 15 minutes).

- A. Provision of more detailed study orientation;
- B. Participants read the Information Sheet and "agreed" to a Waiver of Signed Consent;

During study orientation, the investigators described the study procedure to participants, including the role of the participant and investigators, by including detailed information in an Information Sheet approved by the researchers' Institutional Review Board. During consent, potential participants read and reviewed the Information Sheet provided as a waiver of signed consent. This document informed them of their rights as research participants. Before

participants were able to create a username and password, they must have read over the Information Sheet and clicked on the "agree" button. If the potential participant read the Information Sheet and decided that they did not wish to participate they clicked "disagree" and were routed out of the site. For users who declined to participate, no information was gathered or saved in that part of the consent process.

Step 3: Baseline Assessment (approximately 10 to 30 minutes).

- A. Brief Demographics Questionnaire
- B. Multidimensional Pain Inventory (MPI; Kerns, Turk, & Rudy, 1995)
- C. Coping Strategy Questionnaire (CSQ; Rosentiel & Keefe, 1983)
- D. General Health Questionnaire-12 (GHQ-12; Goldberg & Williams, 1998)
- E. Geriatric Pain Measure-12 (GPM-12; Blozik, et al., 2007)

The assessment tools are all described in detail in the measures section below.

After orientation and consent were conducted, participants were asked to complete the baseline assessment measures online. Participants were informed that this information was kept strictly confidential. The questionnaires and assessment measures were completed and submitted electronically to the secure database.

Following removal of electronic data from the secure server, all assessment information was stored securely in a locked file cabinet in the primary investigator's laboratory office and listed by a participant number, which were assigned after eligibility was determined and used throughout the data

analysis process. The computer that maintained the database was kept in a locked room. The PIs restricted access to the hard drive by using a log-in user name and password. The information will be kept for 5-years and then destroyed.

Baseline assessment measures took approximately 10 to 30-minutes for participants' to complete.

Step 4: Randomization (no participant time required).

- A. The website randomly assigned participants to one of two groups;
- B. Group A received the National Pain Foundation's intervention (Control Condition);
- C. Group B received the www.treatyourpain.com pilot intervention (Experimental Condition)

After the baseline data were received, participants were randomly assigned to either the www.treatyourpain.com group or the control group using a random numbers table. Participants were evenly distributed across groups so that fifteen participants were in each condition. Participants were notified, via the consent process, that this investigation involved two different study groups. Participants were informed that they had equal odds of being assigned to one group or the other. Once randomization was complete, participants immediately routed to the homepage for either condition. For the entire six-week access period, participants would go to the www.treatyourpain.com homepage, log-in and be routed to their appropriate condition.

Step 5: Accessing Health Promotion Information (approximately 9 hours over 6 weeks).

A. Group A: National Pain Foundation's educational and support materials;

B. Group B: www.treatyourpain.com treatment modules

Control Condition: For participants randomized to the information-only control condition, after completion of baseline measures, participants accessed standard pain management information and support provided by the National Pain Foundation's (NPF) website. The content of the NPF website is described in detail on page 40 of this manuscript. Participants were encouraged to review the material and make behavior changes consistent with NPF's recommendations. Participants were informed that they should log-in through the www.treatyourpain.com homepage in order to access the NPF's website for the six week period. The NPF webpage was nested within an iFrame window (shown in Appendix B) on their Internet browser; this allowed the researchers to track how frequently participants in the control group were accessing the control condition.

www.treatyourpain.com Experimental Condition: For participants randomized to the experimental treatment condition they accessed pain management materials grounded in the empirically based standards of care from the American Psychological Association (Keefe, 1996) and expert researchers and clinicians who provide treatment to older adults with persistent pain (Hadjistavropoulos & Hadjistavropoulos, 2008; Lewandowski, 2008; Weiner, Herr, & Rudy, 2001). As described in detail on page 42 of this manuscript, the

intervention included the following six modules: Starting New Treatment, Pain Education for Older Adults, Taking Control of the Effects of Pain, Reducing Emotional Pain and Suffering, Improving Your Functioning While Living with Chronic Pain, and Building Your Pain Community. All modules included homework exercises to practice and rehearse skills in home and community settings, and generalization and maintenance skills such as problem-solving and anticipating setbacks. Each module base page had a menu at the top and was further separated into components that ended with a “return to top” button that allowed the user to navigate the lengthy page with ease. At the conclusion of each module, the user clicked on “I’m done this module, what’s next screen?” which prompted a pop-up window with review questions, acceptability questions, and the menu for additional modules. The Competency and Module Acceptability Assessments are detailed in the Measures section.

Step 6: Post-test Assessment (approximately 10 to 30 minutes).

- A. Multidimensional Pain Inventory (MPI; Kerns, Turk, & Rudy, 1995)
- B. Coping Strategy Questionnaire (CSQ; Rosentiel & Keefe, 1983)
- C. General Health Questionnaire-12 (GHQ-12; Goldberg & Williams, 1998)
- D. Geriatric Pain Measure-12 (GPM-12; Blozik, et al., 2007)
- E. Client Satisfaction Questionnaire (CSQ-8; Attkisson, 1991)

The investigators informed all participants during the consent period that at the conclusion of the study (Week 6), they were going to be prompted to complete post-test assessments online. They were told this would take approximately 10-

30 minutes and this would conclude their participation in the study. At the conclusion of week six, all participants were sent a reminder email to log-in and complete all post-test assessments and questionnaires. The research administrator changed the status of the users from study access to post-test access; this resulted in the users next log-in taking them to the post-test material.

Measures

A. Brief Demographics Questionnaire: The purpose of this 7-item questionnaire was to gather brief demographic information from the participants that allowed later categorization of data. The questionnaire asked for participant's year of birth, gender, country of residence, education level, income level, pain type, and over the counter and prescription pain medication use. Responses were selected from options in drop-down menus or clickable bubble selections.

B. Multidimensional Pain Inventory (MPI; Kerns, Turk, & Rudy, 1995): Only 34 of the original 52-items from the MPI were used in this study. The only modification to the original 52-item instrument was the removal of 18 items that assessed physical functioning and were redundant and better assessed in an older adult population by the Geriatric Pain Measure described below. The purpose of this questionnaire was to provide a comprehensive, yet easy to fill-out, assessment of participant's pain experience. The MPI assessed pain severity, interference, life control, affective distress, social support, and social responses to pain. While a limitation of this instrument is its inception amongst primarily older male veterans, the MPI has been found to have adequate

reliability and validity amongst a wide range of sample populations, including older adults (Kerns, Turk, & Rudy, 1985; Sorkin, et al., 1990; Turk, et al., 1995).

C. Coping Strategy Questionnaire (CSQ; Rosentiel & Keefe, 1983): The purpose of this 48-item questionnaire was to provide a robust assessment of participant coping. The questionnaire assessed eight types of coping strategies: diverting attention, reinterpreting pain sensations, ignoring pain sensations, coping self-statements, praying and hoping, catastrophizing, increasing behavioral activities, and increasing pain behaviors. The CSQ has been found to have good reliability and validity (Rosentiel & Keefe, 1983, DeGood & Tate, 2002; Haythornthwaite, et al., 1998), and has been used successfully to assess coping in older adults (DeGood & Tate, 2002).

D. General Health Questionnaire-12 (GHQ-12; Goldberg & Williams, 1998): The purpose of this 12-item questionnaire was to provide a short yet robust assessment of participant's psychological health. The instrument has been widely studied in the World Health Organization's study of psychological disorders in general medical settings (Goldberg, Gater, Sartorius, Ustun, Piccinelli, Gureje, & Rutter, 1997). The GHQ-12 was found to have good reliability and the country of residence, gender, age, or educational level of respondents did not influence its validity. This questionnaire provided researchers with a brief measure of psychological health from the GHQ-12 total score without a significant participant response burden.

E. Geriatric Pain Measure-12 (GPM-12; Blozik, et al., 2007): The purpose of this 12-item questionnaire was to measure decline in functional status and the

effects of pain intensity on mobility (Blozik, et al., 2007). The GPM-12 has proven to be a practical, short, easy to administer assessment that is useful for measuring treatment outcomes in older adults with pain (Blozik, et al., 2007). The short questionnaire greatly reduces participant response burden while maintaining adequate reliability and validity (Blozik, et al., 2007).

F. Client Satisfaction Questionnaire (CSQ-8; Attkisson, 1991): The CSQ-8 is a brief 8-item questionnaire that measured the degree to which participants were satisfied with the intervention. Raters were asked to indicate on a 4-point Likert Scale the degree to which they agree with statements regarding the efficacy and acceptability of the program. Two items assessing over-the-counter and prescription medication use, repeated the questions from baseline assessment, were included also. These items were all face valid with a high internal consistency and adequate validity (Attkisson, 1991; Attkisson & Zwick, 1983).

G. Competency and Module Acceptability Assessments: At the conclusion of each treatment module, participants in the experimental condition were asked three review questions and three questions asking how engaging, effective, and acceptable they found each module. The review questions asked about content contained in each module and provided two response options, one was correct and one was incorrect. Participants were not provided feedback about their response rate, the number of correct responses was retained for competency analysis. The acceptability questions were rated on a 4-point Likert Scale,

response options will include “poor,” “fair,” “good,” and “excellent.” All items were face valid.

Analyses

A retention analysis was conducted to better understand the flow of attrition amongst participants. Repeated measures of Analyses of Variance (ANOVA), using the Statistical Package for the Social Sciences (SPSS 16, 2010), was conducted across dependent variables to examine changes in: 1) health status outcome variables; 2) coping skill; and 3) health promoting behavior change variables; with experimental condition ($n = 2$) as a between subjects variable and time ($n = 2$) as a within-subjects factor. In the presence of time x group interactions in the expected directions, the repeated measures ANOVA was used to evaluate change over time within group. Item frequency analyses and two-tailed t-tests were conducted on responses to the Client Satisfaction Questionnaire using SPSS (SPSS 16, 2010). Incremental cost-effectiveness ratios (ICER) were calculated to establish the cost-savings of the experimental condition versus the control and versus multidisciplinary treatment (Briggs, Wonderling, & Mooney, 1998). Post-hoc power analyses were also conducted using SAS (SAS 9.2, 2009).

Participants Safety and Risk Mitigation

Conducting research with no-therapist exposure and very limited interaction with researchers required that we address ethical and participant safety issues with utmost care. All researchers met criteria to conduct research by the researcher’s academic Institutional Review Board. Participants received

individual administrative emails from the researcher/administrator of the site. Prior to participation, as reviewed in the procedures section above, individuals read through an Information Sheet detailing the study. The Institutional Review Board accepted their electronic agreement, clicking to agree to the terms of the study after reading the document, as a waiver of signed consent. The information sheet was written without jargon, at a 7-8th grade reading level, and in large font. Contact information for the researchers and their Institutional Review Board, was printed on the information sheet; however, no participants contacted researchers during the course of the study. Because the study was conducted with a waiver of signed consent no contact (except double encrypted email addresses) or identifying information was gathered from participants.

The primary risk of online research includes a potential breach of confidentiality; this minimal contact design permitted a reduction of risk to participants. Additionally, all participants were reminded of their right to withdraw from treatment, informed of the innovative nature of the experimental condition, and the extensive programming efforts that were taken to ensure that all data and assessment information would be safe and secure. All data was accessed with secure username and password; the researcher in charge of web-site administration also required a secure username and password.

Chapter 4

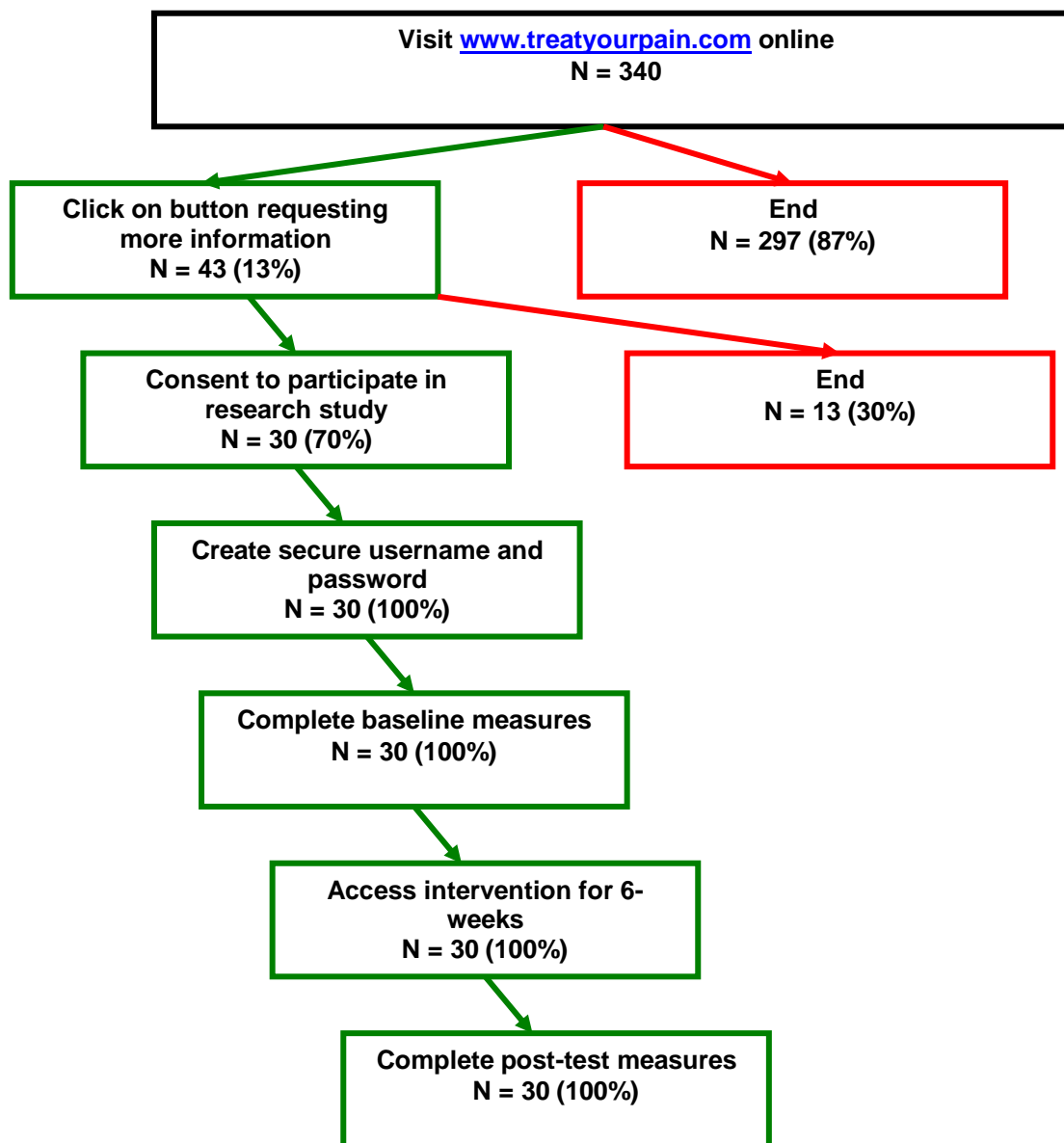
Results

Phase I: Treatment Development and Retention Analysis

As an integral part of Stage 1 treatment development research (Rounsaville et al., 2001), the first phase of our analysis involved the examination of initial treatment acceptability. The initial introduction of the treatment site provided valuable information regarding attrition, retention, and possible barriers to access.

A descriptive retention analysis (See Figure 1) delineated each step in the treatment process and examined the number of participants who successfully completed each step.

Figure 1. Retention Analysis



We further examined those steps associated with dropout rates of greater than 30%. We used qualitative data to supplement these findings and identify reasons for attrition. Based on these findings, we identified two potential primary barriers to access and retention. These barriers were hypothesized as: 1) strict inclusion criteria (87% attrition); and 2) perceived participant burden to complete baseline assessments and or discomfort with participating in research study (30% attrition). Interestingly, from the time participants consented to participate in the research study the attrition rate was zero percent. Based on these observations of low attrition amongst consenting participants, no modifications to treatment delivery were made throughout the study.

Over the 4-month pilot period, 340 individuals accessed the home page for the web-based treatment program for older adults with chronic pain. On average 85 individuals accessed the website on a monthly basis. Sufficient numbers of older adults were easily able to access the web-based intervention by entering key search terms in the search engine Google; this produced a banner advertisement for this web-based intervention service at the top and top right of their screen. Once potential participants had clicked on the advertisement and had been taken to the intervention home page, 13% (n = 43) of the initial sample clicked on a button requesting more information. This first step was identified as the most significant barrier to access. However, given that an unknown percentage of the initial sample may not have met criteria this rate could be representative of appropriate self-selection. Seventy percent (70%, n = 30) of that sample consented to participate in the research study, created a

secure username and password, and completed baseline assessments. Efforts were made during treatment development to keep participant burden low, this may have helped produce a 100% retention rate throughout completion of baseline assessments, randomization, six-week treatment access, and completion of post-intervention assessments. It should be noted that a zero attrition rate is somewhat unusual, given the 18-20% published in other mental health treatment studies (Stinson, McGrath, Hodnett, Feldman, Duffy, Huber, et al., 2010), and will be explored more in the discussion.

Phase 2: Evaluation of Hypothesized Mechanisms of Change and Trends

Continuing with the goals and procedures of Stage 1 treatment development research (Rounsaville et al., 2001), we acknowledged a priori that our sample size ($n = 15$ per cell) would probably not provide adequate power to evaluate the statistical significance of our findings or draw causal inferences. Our power analyses will be discussed following the initial results section. Analyses consisted of mixed repeated measure analysis of variance, with experimental condition ($n = 2$: experimental and control condition) serving as the between-subjects factor and time ($n = 2$: baseline and post-test data) serving as the within-subjects factor. Repeated measures analysis of variance was used to evaluate: 1) hypothesized mechanisms of change; and 2) trends toward clinical efficacy. Two-tailed t-tests were conducted on the data regarding participant acceptance. Each cell had 15 participants. This design structure and the probability of a Type 1 error were maintained at .05 for all analyses. Prior to analysis, the data was inspected for outliers and adherence to parametric

assumptions. While there were some instances of statistical outliers, there were no data points outside of the appropriate response range, and no data were missing. Inspection of the pre-and post-intervention data showed that some parametric assumptions were violated for some dependent variables. There were some instances of violations of normality (significant skew and or kurtosis), and at times unequal variances (significant Levene's Test). Log 10 transformation did not result in an improvement; because of this and since the ANOVA is inherently robust, the following analyses were conducted on untransformed data. Thus, the following results should be interpreted with caution due to the potential inflation of Type I error (Keppel, 1991).

Demographics

Demographics information was only collected from consenting participants, therefore information on those who clicked on the site advertisement (n = 430) but did not consent is unknown. Seventy percent (n = 30) of participants who began the consent process (n = 43) completed it; of these individuals 73.33% (n = 22) were female and 26.7% (n = 8) were male, the average age was 67 years (SD = 3.33, range 60-74), 100% reported living in the USA, 30% (n = 9) had 9-12 years of education, 30% (n = 9) had some college, 30% (n = 9) had a college degree, and 10% (n = 3) had a MA or PhD. Nearly seven percent (n = 2) had an annual household income of \$9,800-20,000, 43.33% (n = 13) from \$20,000-50,000, and 50% (n = 15) of individuals reported an annual income of greater than \$50,000. Thirteen percent (13.33%, n = 4) reported pain duration from 6-9 months, 23.33% (n = 7) for 9-12 months, 30% (n

= 9) for 12-24 months, and 33.33% (n = 10) for longer than 24 months. The most frequent causes of chronic pain were arthritis (26.67%, n = 8), back and neck problems (20%, n = 6), neuropathic pain (13.33%, n = 4), post-surgical pain (10%, n = 3), fibromyalgia (6.67%, n = 2), headache (6.67%, n = 2), post-herpetic neuralgia (6.67%, n = 2), and one individual each experiencing circulatory pain, cancer, and pelvic pain (3.33% respectively).

Hypothesis 1: At post-test, participants in the www.treatyourpain.com experimental condition would demonstrate improved health status as evidenced by: 1) lower ratings on the Multidimensional Pain Inventory subscales (0-10 pain intensity rating and Pain Intensity subscale, Pain Interference, Life Control, Affective Distress); and 2) higher ratings on the General Health Questionnaire total score.

0-10 Pain Intensity Scale: Extant literature has established definitions for mild, moderate, and severe pain based on responses to a 0 to 10 scale (Cleeland, Gonin, Hatfield, et al., 1994; Cleeland & Syrjaia, 1992); this is the type of scale used by the Geriatric Pain Measure and the Multidimensional Pain Inventory. Typically responses less than 3 have been considered mild pain, responses ranging from 3 to 7 are moderate pain, and 7 and higher is considered severe pain (Cleeland, et al., 1994; Cleeland & Syrjaia, 1992). When asked about the intensity of their pain over the last seven days, at baseline within our experimental condition 0% had mild pain, 53% had moderate pain (lowest reported pain level was 5), and 47% had severe pain. At baseline, older adults in the control condition sample showed 0% had mild pain, 53% had moderate pain

(lowest pain level was 3), and 47% had severe pain. At post-test, in the experimental condition 13% had mild pain, 87% moderate pain (range 3-6), and 0% severe pain. The control condition had 13% mild pain, 67% moderate pain, and 20% severe pain. The change in pain intensity ratings were computed and a two-tailed t-test confirmed that participants in the experimental group ($M = 2.53$, $SD = 1.30$) reduced their 0-10 pain intensity score more significantly than those in the control group ($M = 1.00$, $SD = 1.55$; $t(28) = 2.92$, $p = 0.007$).

Multidimensional Pain Inventory (MPI) Pain Intensity. All participants reported pain intensity ratings on two different measures, a cumulative score from three items on the Geriatric Pain Measure and a cumulative score from three items on the Multidimensional Pain Inventory (MPI). The pattern of results was consistent between measures with significant interaction effect and significant main effect for time but not group. Therefore, only the results from the more robust MPI will be reported. On a scaled score of 0-6 with 6 as more intense, older adults in the experimental condition reported a decrease in the construct of pain intensity from an average of 4.00 at baseline ($M = 4.00$, $SD = 0.984$) to 2.16 at post-test ($M = 2.16$, $SD = 0.99$). Older adults in the control condition also reported a decrease in pain intensity from baseline ($M = 3.44$, $SD = 1.77$) to post-test ($M = 2.93$, $SD = 1.50$). Repeated measures Analysis of Variance demonstrated a significant main effect for time ($F(1,28) = 44.54$, $p < 0.001$, partial eta squared = 0.61,) and a non-significant main effect for group ($F(1,28) = 0.06$, $p = 0.81$, partial eta squared = 0.002). There was a significant group X time interaction in the expected direction ($F(1,28) = 14.27$, $p = 0.001$,

partial eta squared = 0.338). Contrast analysis of marginal means and visual inspection of the interaction graph show both groups reporting a decrease in pain intensity across time, but the treatment group reporting an higher mean at baseline and a lower mean at post-test. Computed change scores and a two-tailed t-test confirmed that the experimental condition decreased their reported levels of pain severity ($M = 1.84$, $SD = 1.03$) more significantly than participants in the control condition ($M = 0.51$, $SD = 0.90$; $t(28) = 3.78$, $p = 0.001$).

MPI Pain Interference. Older adults in the experimental condition indicated a decrease in pain related interference with professional and personal activities from baseline ($M = 2.96$, $SD = 1.23$) to post-test ($M = 2.03$, $SD = 0.86$), while individuals in the control condition reported similar rates of interference at baseline ($M = 2.92$, $SD = 1.61$) and a small decrease at post-test ($M = 2.66$, $SD = 1.50$). Repeated measure Analysis of Variance demonstrated a significant main effect of time ($F(1,28) = 28.70$ $p < 0.001$, partial eta squared = 0.51) but not between groups ($F(1,28) = 0.38$, $p = 0.54$, partial eta squared = 0.01). There was a significant group X time interaction in the expected direction ($F(1, 28) = 9.17$, $p < 0.001$, partial eta squared = 0.23). Contrast analysis of marginal means and the interaction graph show the marginal mean of the treatment group higher than the control group at baseline and then crossing to and showing lower levels of pain related interference at post-test. Change scores were computed and a two-tailed t-test confirmed that the experimental condition ($M = 0.93$, $SD = 0.72$) reduced their pain related interference more significantly than participants in the control condition ($M = 0.26$, $SD = 0.47$; $t(28) = 3.03$, $p = 0.005$).

MPI Life Control. Older adults in the experimental condition reported an increase in levels of life control from baseline ($M = 2.50$, $SD = 1.64$) to post-test ($M = 4.27$, $SD = 0.73$). Individuals in the control condition had similar levels of life control at baseline ($M = 2.47$, $SD = 1.41$) but increased very little when measured at post-test ($M = 2.67$, $SD = 1.06$). Repeated measures Analysis of Variance showed a significant main effect of time ($F(1,28) = 28.00$, $p < 0.001$, partial eta squared = .47), between group differences resulted in a non-significant main effect ($F(1,28) = .89$, $p = 0.35$, partial eta squared = 0.03). However, there was a significant group X time interaction effect in the expected direction ($F(1, 28) = 15.70$, $p < 0.001$, partial eta squared = .36). Contrast analysis of marginal means and the interaction graph show the marginal mean of the treatment group starting just slightly higher than control group at baseline and then increasing to a much higher level of life control post-test. The marginal mean also increased for the control group, but not as significantly. Computed change scores and a two-tailed t-test confirmed that the experimental condition ($M = -1.77$, $SD = 1.26$) significantly increased their ratings of life control compared to the control condition ($M = -0.20$, $SD = 0.86$; $t(28) = -3.96$, $p < 0.001$).

MPI Affective Distress. Older adults in the experimental condition reported a decrease in affective distress associated with chronic pain from baseline ($M = 2.96$, $SD = 1.92$) to post-test ($M = 1.44$, $SD = .60$). Individuals in the control condition did not report much change in levels of affective distress from baseline ($M = 2.80$, $SD = 1.98$) to post-test ($M = 2.60$, $SD = 1.49$). Following the pattern of results so far, repeated measures Analysis of Variance

demonstrated a significant main effect of time ($F(1,28) = 12.60$, $p = 0.001$, partial eta squared = 0.31), but not for between group main effects ($F(1,28) = .38$, $p = 0.54$, partial eta squared = 0.01). Again, there was a significant group X time interaction effect in the expected direction ($F(1, 28) = 7.39$, $p = 0.01$, partial eta squared = 0.21). Contrast analysis of marginal means and the interaction graph show the marginal mean of the treatment group starting just higher than control group at baseline and then decreasing to report affective distress less frequently than the control, which changed very little over time. Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = 1.51$, $SD = 1.59$) decreased their levels of pain related affective distress more significantly than individuals in the control condition ($M = 0.20$, $SD = 0.97$; $t(28) = 2.72$, $p = 0.01$).

General Health Questionnaire (GHQ) General Measure of Psychological Wellbeing. Older adults in the experimental condition reported initially lower levels of psychological wellbeing ($M = 3.20$, $SD = 2.18$) than individuals in the control group ($M = 4.47$, $SD = 2.53$). At post-test the experimental condition reported considerably increased report of wellbeing ($M = 11.00$, $SD = .93$) when compared to the control ($M = 5.20$, $SD = 2.45$). Repeated measures Analysis of Variance demonstrated a significant main effect of time ($F(1,28) = 101.00$, $p < 0.001$, partial eta squared = 0.78) and significant between group differences ($F(1,28) = 77.07$, $p = 0.002$, partial eta squared = .30). There was a significant group X time interaction effect in the expected direction ($F(1, 28) = 69.30$, $p < 0.001$, partial eta squared = 0.71). Contrast analysis of marginal means and the

interaction graph show the marginal mean of the treatment group starting slightly lower than the control group, then crossing above the control to end at high levels of reported psychological wellbeing. The control group's marginal mean also increased over time, but not as significantly. Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = -7.80$, $SD = 2.27$) increased their levels of general psychological wellbeing more significantly than individuals in the control condition ($M = 0.73$, $SD = 2.37$; $t(28) = -8.32$, $p < 0.001$).

Hypothesis 2: At post-test, participants in the www.treatyourpain.com experimental condition would demonstrate improved coping skill acquisition and increased health promoting behaviors as evidenced by: 1) higher ratings on subscales of Coping Strategies Questionnaire subscales (coping self statements, catastrophizing, praying and hoping, ignoring sensations, increased pain behaviors, use of relaxation); 2) increase in positive/solicitous support on the Multidimensional Pain Inventory subscale; 3) lower ratings on Geriatric Pain Measure subscales (disengagement, ambulation); and 4) decreased consumption of over-the-counter and prescription pain medication.

Coping Strategies Questionnaire (CSQ) Coping Self-Statements. Older adults in the experimental condition increased their average number of coping self-statements from 17 at baseline ($M = 17.07$, $SD = 10.12$) to 27 at post-test ($M = 27.33$, $SD = 5.08$). The average use of coping self-statements started lower and decreased very slightly over time for individuals in the control condition from baseline ($M = 14.13$, $SD = 10.05$) to post-test ($M = 13.80$, $SD = 8.26$). Repeated

measures Analysis of Variance demonstrated a significant main effect of time ($F(1,28) = 23.22, p < 0.001, \text{partial eta squared} = .45$) and for group ($F(1,28) = 7.66, p = .01, \text{partial eta squared} = 0.22$). There was also a significant group X time interaction effect in the expected direction ($F(1, 28) = 26.45, p < 0.001, \text{partial eta squared} = 0.49$). Contrast analysis of marginal means and the interaction graph show the mean of the treatment group started slightly higher and then increased significantly more while the control group decreased slightly across time. Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = -10.27, SD = 6.75$) increased their use of coping self-statements more significantly than individuals in the control condition ($M = 0.33, SD = 4.27; t(28) = 5.14, p < 0.001$).

CSQ Catastrophizing. Individuals in the experimental condition demonstrated a decrease in catastrophic thinking from baseline ($M = 10.07, SD = 5.75$) to post-test ($M = 1.47, SD = 1.25$). Those in the control condition showed a very slight decrease during from baseline ($M = 8.60, SD = 6.15$) to post-test ($M = 7.53, SD = 5.10$). Again, a repeated measures Analysis of Variance showed a significant main effect of time ($F(1,28) = 23.22, p < 0.001, \text{partial eta squared} = 0.45$) but not for between group differences ($F(1,28) = 1.94, p = 0.18, \text{partial eta squared} = 0.07$). There was a significant group X time interaction effect in the expected direction ($F(1, 28) = 26.45, p < 0.001, \text{partial eta squared} = 0.49$). Contrast analysis of marginal means and the interaction graph show the marginal mean of the treatment group starting slightly higher and then crossing to a lower score than the control group, which also decreased but not as much. Change

scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = 8.60$, $SD = 5.10$) decreased their catastrophizing more significantly than individuals in the control condition ($M = 1.07$, $SD = 2.69$; $t(28) = 5.07$, $p < 0.001$).

CSQ Praying and Hoping. Older adults in the experimental condition decreased their use of praying and hoping to cope with pain from baseline ($M = 7.80$, $SD = 7.05$) to post-test ($M = 2.13$, $SD = 2.90$), those in the control condition increased their use of praying and hoping from an average of 9 at baseline ($M = 9.33$, $SD = 6.47$) to an average of 10 at post-test ($M = 10.07$, $SD = 5.50$). Repeated measures Analysis of Variance found a significant within subject main effect of time ($F(1,28) = 9.46$, $p = 0.005$, partial eta squared = 0.25) and a significant between subject main effect of group ($F(1,28) = 6.06$, $p = 0.02$, partial eta squared = 0.18). There was a significant group X time interaction effect in the expected direction ($F(1, 28) = 15.92$, $p < 0.001$, partial eta squared = 0.36). Contrast analysis of marginal means and the interaction graph show the marginal mean of the treatment group starting slightly lower at baseline and ending much lower at post-test while the control group reported slightly higher rates of praying and hoping over time. Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = 5.67$, $SD = 5.15$) decreased their use of praying and hoping to cope with pain more significantly than individuals in the control condition ($M = -0.73$, $SD = 3.47$; $t(28) = 3.99$, $p < 0.001$).

CSQ Ignoring Sensations. Older adults in the experimental condition decreased how much the ignored pain sensations from an average score of 9 at baseline ($M = 9.13$, $SD = 7.45$) to an average of 5 at post-test ($M = 4.87$, $SD = 2.97$), those in the control group reported a lower average use of ignoring at baseline ($M = 6.80$, $SD = 6.87$) and basically maintained this level during the intervention ($M = 7.20$, $SD = 6.33$). Repeated measures Analysis of Variance showed a significant main effect of time ($F(1,28) = 2.87$, $p = 0.02$, partial eta squared = .17) but not for group ($F(1,28) = 0.00$, $p = 1.00$, partial eta squared < 0.001). There was a significant group X time interaction effect in the expected direction ($F(1, 28) = 8.56$, $p = 0.007$, partial eta squared = 0.23). Contrast analysis of marginal means and the interaction graph show the marginal mean of the treatment group reporting higher rates of ignoring pain sensations at baseline and then crossing to report lower rates of ignoring sensations at post-test, the marginal mean of the control group increased slightly over time. Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = 4.27$, $SD = 5.42$) decreased their report of ignoring pain sensations more significantly than individuals in the control condition ($M = -0.40$, $SD = 2.97$; $t(28) = 2.93$, $p = 0.007$).

CSQ Increased Pain Behaviors. Individuals in the experimental condition decreased their reported demonstration of pain behaviors from baseline ($M = 10.20$, $SD = 6.56$) to post-test ($M = 7.60$, $SD = 3.02$). Those individuals in the control condition maintained their levels of pain behaviors from baseline to post-test ($M = 10.73$, $SD = 5.35$; $M = 10.73$, $SD = 5.13$, respectively). Repeated

measures Analysis of Variance demonstrated a significant main effect of time ($F(1,28) = 5.73$, $p = 0.02$, partial eta squared = 0.17) but not for between group differences ($F(1,28) = 1.03$, $p = 0.32$, partial eta squared = 0.04). There was a significant group X time interaction in the expected direction ($F(1, 28) = 5.73$, $p = 0.02$, partial eta squared = 0.17). Contrast analysis of marginal means and the interaction graph show the marginal mean of the treatment group starting slightly lower and then reducing to a significantly lower score than the control group, who maintained the same marginal mean over time. Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = 2.60$, $SD = 4.00$) decreased their reported pain behaviors more significantly than individuals in the control condition ($M = 0.00$, $SD = 1.30$; $t(28) = 2.39$, $p = 0.02$).

CSQ Relax. How often participants used relaxation as a coping skill was assessed with a single item (0-never, 6-always) in the CSQ. This item is normally included as one item in the "Pain Behavior" composite described above; however, here it was conceptualized as an effective skills, rather than a pain behavior and analyzed alone in order to assess the change in frequency with which participants used relaxation techniques. At baseline older adults in the experimental condition reported using relaxation to cope with an average score of 1 (0-6, 0-never and 6-always) at baseline ($M = 1.33$, $SD = 1.45$) and 3 at post-test ($M = 3.20$, $SD = .94$). Individuals in the control condition reported a higher baseline average score of 3 ($M = 2.67$, $SD = 1.68$) and maintained this level ($M = 2.67$, $SD = 1.68$). Repeated measures Analysis of Variance showed a significant

main effect of differences within subjects over time ($F(1,28) = 53.28, p < 0.001$, partial eta squared = 0.66) but not for between group differences ($F(1,28) = 0.59, p = 0.45$, partial eta squared = 0.02). There was a significant group X time interaction effect in the expected direction ($F(1, 28) = 53.28, p < 0.001$, partial eta squared = 0.66). Contrast analysis of marginal means and the interaction graph show the marginal mean of the treatment group using relaxation very infrequently and then crossing to report much more frequent relaxation post-test; relaxation rates were maintained over time for the control group. Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = -1.87, SD = 0.74$) increased the frequency of coping with relaxation more significantly than individuals in the control condition ($M = 0.00, SD = 0.65; t(28) = -7.30, p < 0.001$).

MPI Support. Older adults in the experimental condition reported similar levels of overall support from baseline ($M = 2.29, SD = 1.76$) to post-test ($M = 2.60, SD = 1.11$), as did those in the control condition ($M = 3.05, SD = 1.22; M = 2.98, SD = 1.29$, respectively). These differences were tested using repeated measures Analysis of Variance. There was a non-significant main effect of time ($F(1,28) = .98, p = 0.33$, partial eta squared = 0.03); for group ($F(1,28) = 1.37, p = 0.25$, partial eta squared = 0.05); and a non-significant group X time interaction ($F(1, 28) = 2.34, p = 0.14$, partial eta squared = 0.08). Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = -0.31, SD = 0.81$) did not significantly differ in their reports of

support from a significant other compared to individuals in the control condition ($M = 0.07$, $SD = 0.51$; $t(28) = -1.53$, $p = 0.14$).

When the supportive relationship was looked at more specifically through three different subscales on the MPI (negative responses, solicitous responses, and distracting responses) a similar pattern of non-significance, with small effect sizes, was found. The only exception was in the negative responses subscale; for this subscale the group X time interaction was significant ($F(1,28) = 8.58$, $p = 0.007$, partial eta squared = 0.23). The marginal mean for the experimental group decreased more over time than the marginal means for the control. There was also a significant main effect of time ($F(1,28) = 12.64$, $p = 0.001$, partial eta squared = .31).

Health Promoting Activity & Engagement

Geriatric Pain Measure (GPM) Disengagement Subscale. In a measure of disengagement from professional and personal activities due to chronic pain, older adults in the experimental condition reported higher levels at baseline ($M = 17.67$, $SD = 3.72$) than at post-test ($M = 10.67$, $SD = 4.58$). Those individuals in the control condition also reported initially high levels of disengagement, but their change from baseline ($M = 17.00$, $SD = 3.68$) to post-test ($M = 15.67$, $SD = 4.95$) was smaller. A repeated measures Analysis of Variance demonstrated a significant main effect of time ($F(1,28) = 55.38$, $p < 0.001$, partial eta squared = 0.66; but not for between group main effects ($F(1,28) = 2.22$, $p = 0.15$, partial eta squared = .07). There was a significant group X time interaction effect in the expected direction ($F(1, 28) = 25.61$, $p < 0.001$, partial eta squared = .48).

Contrast analysis of marginal means and the interaction graph show the marginal mean of the treatment group slightly higher than the control at baseline and then crossing to a lower marginal mean post-test, while the control group decreases but significantly. Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = 7.00$, $SD = 3.68$) decreased their levels disengagement due to pain more significantly than individuals in the control condition ($M = 1.33$, $SD = 2.29$; $t(28) = 5.06$, $p < 0.001$).

GPM Ambulation. Older adults in the experimental condition reported an decrease in pain with ambulation over time from an average score of 19 at baseline ($M = 19.33$, $SD = 7.29$) to 11 at post-test ($M = 11.33$, $SD = 7.43$), individuals in the control condition didn't show such a decrease ($M = 19.33$, $SD = 7.04$; $M = 19.00$, $SD = 7.12$; baseline and post-test respectively). A repeated measure Analysis of Variance demonstrated a significant within subject main effect of time ($F(1,28) = 31.48$, $p < 0.001$, partial eta squared = 0.53, but not for between group differences ($F(1,28) = 2.30$, $p = 0.14$, partial eta squared = 0.08). There was a significant group X time interaction effect in the expected direction ($F(1, 28) = 26.64$, $p < 0.001$, partial eta squared = 0.49). Contrast analysis of marginal means and the interaction graph show the marginal mean of the treatment group and the control group being the same at baseline and the control group decreasing slightly while the experimental group decreased significantly more. Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = 8.00$, $SD = 5.28$) decreased their

levels of pain related affective distress more significantly than individuals in the control condition ($M = 0.33$, $SD = 2.29$; $t(28) = 5.16$, $p < 0.001$).

Medication Use. All participants reported the number of days per week that they consumed over the counter and prescription pain medications. At baseline the experimental condition consumed over the counter pain medication an average of 6.5 days per week ($M = 6.47$, $SD = 0.92$) and this was reduced to an average of 3 days per week at post-test ($M = 2.93$, $SD = 0.80$). Older adults in the control condition consumed over the counter medication an average of 5 days per week at baseline ($M = 5.13$, $SD = 2.07$) and maintained this 5 days a week average at post-test ($M = 4.87$, $SD = 2.33$). A repeated measures Analysis of Variance showed a significant within subject main effect of time ($F(1,28) = 146.73$, $p < 0.001$, partial eta squared = 0.84), but not for between group differences ($F(1,28) = 0.26$, $p = 0.62$, partial eta squared < 0.001). There was a significant group X time interaction effect in the expected direction ($F(1,28) = 108.43$, $p < 0.001$, partial eta squared = 0.80). Contrast analysis of marginal means and the interaction graph show the mean of the experimental group starting higher and then crossing to a lower rate than the control group at post-test. Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = 3.53$, $SD = 0.99$) decreased the days per week they consumed an over-the-counter pain medication more significantly than individuals in the control condition ($M = 0.27$, $SD = 0.70$; $t(28) = 10.41$, $p < 0.001$).

Older adults in the experimental condition consumed prescription pain medication an average of 5 days per week at baseline ($M = 4.87$, $SD = 2.03$) and reduced this to an average of 2 days per week at post-test ($M = 1.87$, $SD = 1.51$). There was little change to the 3 days per week average for individuals in the control condition from baseline ($M = 3.40$, $SD = 3.04$) to post-test ($M = 3.47$, $SD = 2.88$). A repeated measures Analysis of Variance demonstrated similar results to over the counter medication use, there was a significant main effect of time ($F(1,28) = 30.66$, $p < 0.001$, partial eta squared = 0.52), and a non-significant main effect for group ($F(1,28) = 0.01$, $p = 0.94$, partial eta squared < 0.001). There was also a group X time interaction in the expected direction ($F(1,28) = 33.51$, $p < 0.001$, partial eta squared = 0.55). Contrast analysis of the marginal means and interaction graph tells us that the mean for the experimental group decreased to cross below the control group post-test score, the control group had increased their rate of use across the same time. Change scores were computed and a two-tailed t-test confirmed that participants in the experimental condition ($M = 3.00$, $SD = 0.99$) decreased the days per week they consumed an over-the-counter pain medication more significantly than individuals in the control condition ($M = -0.07$, $SD = 0.80$; $t(28) = 5.79$, $p < 0.001$).

Hypothesis 3: At post-test, participants in the www.treatyourpain.com experimental condition would demonstrate high levels of treatment satisfaction as evidenced by higher scores on the Client Satisfaction Questionnaire than participants in the control condition. Participants in the experimental condition

would report high levels of mastery of material and acceptability of the treatment modules throughout the intervention.

Treatment Satisfaction

In an effort to assess how well participants in the experimental condition were adhering to the content of each module, at the conclusion of every module they were asked three questions with correct/incorrect clickable response options and this information was retained as a total correct (total score out of 3) to provide information on how well participants mastered the material. Following the brief competency assessment, data was gathered about the acceptability of each module (how engaging, effective, and acceptable the overall module was on a scale of 1-poor, 2-fair, 3-good, 4-excellent). The data from each intervention module is summarized in Table 1.

Table 1. Module Competency and Acceptability Ratings

Module	Item	Score/Response	Frequency (n)	Percent (%)
1. Starting new treatment	Competency (total correct out of 3)	3	15	100
	Engaging	Good	5	33
		Excellent	10	67
	Effective	Fair	2	13
		Good	8	56
		Excellent	5	33
	Acceptable	Good	11	73
		Excellent	4	27
2. Education	Competency	2	2	13
		3	13	87
	Engaging	Good	4	27
		Excellent	11	73
	Effective	Fair	1	7
		Good	11	73
		Excellent	3	20
	Acceptable	Good	8	53

		Excellent	7	47	
3. Control/Skills	Competency	3	15	100	
	Engaging	Excellent	15	100	
		Good	4	27	
	Effective	Excellent	11	73	
		Good	5	33	
Excellent		10	67		
4. Emotions	Competency	2	3	20	
		3	12	80	
	Engaging	Fair	2	13	
		Good	5	33	
		Excellent	8	53	
	Effective	Fair	2	13	
		Good	12	80	
		Excellent	1	4	
	Acceptable	Good	12	80	
		Excellent	3	20	
	5. Functioning	Competency	3	15	100
		Engaging	Good	5	33
			Excellent	10	67
		Effective	Fair	1	7
Good			3	20	
Excellent			11	73	
Acceptable		Good	9	60	
		Excellent	6	40	
6. Building Community		Competency	2	3	20
			3	12	80
	Engaging	Fair	4	27	
		Good	10	67	
		Excellent	1	7	
	Effective	Fair	1	7	
		Good	13	87	
		Excellent	1	7	
	Acceptable	Good	13	87	
		Excellent	2	13	

Only 8 individuals received less than 100% on any of the 18 competency assessments. Similarly, there was a high frequency of “good” and “excellent” responses to the different modules as engaging, effective, and acceptable. In order to ascertain potential areas of website improvement it is particularly

important to note that 2 users reported the effectiveness of the “starting new treatment” module as “fair”; 1 user rated the effectiveness of the education module as “fair”; 2 participants rated the engagingness of the emotions module as “fair” and the effectiveness of the emotional pain and suffering module as “fair”; 1 participant rated the effectiveness of the improving your functioning module as “fair”; and 4 participants rated the level of engaging-ness of the building your community module as “fair” and 1 participants rated the effectiveness of that module as “fair.” This suggests that future improvements should target improving the effectiveness of the delivery of material; this will be addressed in the discussion below.

Treatment satisfaction and acceptability was further assessed amongst both conditions with the Client Satisfaction Questionnaire (CSQ-8). A series of two-tailed t-tests were conducted on the eight different items, each of which assessed different aspects of client satisfaction and intervention acceptability at post-test. The experimental group reported significantly higher levels of satisfaction than the control group on each question of the Coping Strategies Questionnaire; see Table 2. Comparisons of the percentages of responses between the experimental group and control showed important differences in the acceptability and satisfaction of the interventions. As shown in Table 3, higher percentages of individuals in the experimental condition versus the control condition liked the service they received, got what they wanted, had their needs met, would recommend the service to others, got enough help, were able to deal

more effectively with their problems, were generally very satisfied, and would return to the service.

Table 2. Satisfaction Data for Treatment and Control Group Participants by Questionnaire Item

Item	Treatment Group			Control Group			T-test	
	<u>M</u>	<u>SD</u>	<u>n</u>	<u>M</u>	<u>SD</u>	<u>n</u>	<u>df</u>	<u>t</u>
CSQ1	3.60	.507	15	2.60	.507	15	28	5.401*
CSQ2	1.60	.507	15	3.20	.676	15	28	-7.332*
CSQ3	3.13	.352	15	1.87	.352	15	28	9.859*
CSQ4	1.27	.458	15	2.60	.737	15	28	-5.953*
CSQ5	1.87	.743	15	3.27	.704	15	28	-5.298*
CSQ6	3.87	.352	15	2.73	.458	15	28	7.603*
CSQ7	3.67	.488	15	1.93	.458	15	28	10.034*
CSQ8	1.27	.458	15	3.13	.516	15	28	-10.477*

*p < .001, all items are detailed in Table 3.

Table 3. Client Satisfaction Questionnaire Item Analysis

Client Satisfaction Questionnaire Item Description	Response Description		Response Description		Response Description		Response Description	
	Tx%*	Cx%*	Tx %	Cx %	Tx %	Cx %	Tx %	Cx %
1. How would you rate the quality of service you received?	Excellent		Good		Fair		Poor	
	60	-	40	60	-	40	-	-
2. Did you get the kind of services you wanted?	No, definitely not		No, not really		Yes, generally		Yes, definitely	
	-	33	-	53	60	13	40	-
3. To what extent has our program met your needs?	Almost all of my needs have been met		Most of my needs have been met		Only a few of my needs have been met		None of my needs have been met	
	13		87		87		13	
4. If a friend were in need of similar help, would you recommend our program to him or her?	No, definitely not		No, not really		Yes, generally		Yes, definitely	

	-	13	-	33	26	53	73	-
5. How satisfied are you with the amount of help you received?	Quite dissatisfied		Indifferent of mostly dissatisfied		Mostly satisfied		Very satisfied	
	7	40	-	47	67	13	27	-
6. Have the services you received helped you to deal more effectively with your problems?	Yes, they helped a great deal		Yes, they helped somewhat		No, they really didn't help		No, they seemed to make things worse	
	87	-	13	73	-	27	-	-
7. In an overall, general sense how satisfied are you with the service you received?	Very satisfied		Mostly satisfied		Indifferent or moderately dissatisfied		Quite dissatisfied	
	67	-	33	7	-	80	-	13
8. If you were to seek help again, would you come back to our program?	No, definitely		No, I don't think so		Yes, I think so		Yes, definitely	
	-	20	-	73	27	7	73	-

*Tx%: Percentage of individuals responding from experimental condition; Cx%: Percentage of individuals responding from control condition

Additional Project Goals

Effect Size, Power, and Sample Size

The researcher consulted with the University of Nevada, Reno Statistical and Consulting Center to establish the most valid post-hoc power analysis that could be conducted on the efficacy variables to determine the sample size for future randomized controlled trials. The effect sizes and power analyses were conducted on two primary outcome variables, pain intensity and general psychological wellbeing, in an effort to establish an appropriate sample size to detect clinically significant change on these two variables in future research.

Looking at the partial eta squared from the Analysis of Variances conducted on

pain intensity and general psychological wellbeing; the interactions and main effect of time both had large effect sizes (based on the literature we consider anything greater than 0.14 large, Keppel, 1991). The interaction of group by time for pain intensity accounted for 34% of the overall variance in the model, the within subject effect of time accounted for 61% of the variance within the model. The interaction of group by time for psychological well being accounted for 71% of the variance in the model, main effect of time 78%, and main effect of group 30%, all considered large effect sizes.

When a power analysis was conducted on the outcome variable pain intensity, it was found that any future randomized controlled trials (RCT) would require an N of 126 per group to have a power of 0.80. When a power analysis was conducted on general psychological wellbeing, it was found that any future RCT would need an N of 68 per group to achieve a power of 0.80. Based on these two outcome measures, it is suggested that any future RCT include a minimum of 150 people, assuming some attrition would occur, in hopes of the study being conducted with sufficient power to detect clinically significant change.

Cost-effectiveness Data

The details of the development costs for the experimental condition, the cost of accessing the not-for-profit control condition, and the estimated equivalent cost for face-to-face services are detailed in Table 4. The cost-offset effect, which is the mean costs of health care services among intervention patients minus the mean costs of those services among patients receiving similar quantities of face-to-face psychological care, would be \$ 20,250 - \$ 4,800 =

\$15,450. This is a cost savings ratio of over 4:1 for the web-based services, and this model would change substantially if the website had been provided to a larger number of individuals that would have increased the estimated face-to-face costs.

Table 4. Actual and Estimated Treatment Costs

Intervention Type	Description	Cost
Experimental condition	70 hours of MA time (\$20/hr)	\$ 1,400.00
www.treatyourpain.com	4 hours of expert consulting (\$150/hr)	\$ 600.00
	Website programming	\$ 2,000.00
	Advertising	\$ 800.00
	Total for 15 people:	\$ 4,800.00
	Average per person:	\$ 320.00
Control condition	Existing not-for-profit service	\$ 0.00
Face-to-face services	9 hours of psychological services at national average of \$150.00 per hour	\$ 1,350.00
	Total for 15 people:	\$20,250.00

Incremental cost-effectiveness ratio (ICER) is the measure primarily used to compare the “value” of adding an additional treatment or service with a fixed cost (Strosahl, 2001). Value is considered to be the increase in treatment efficacy relative to whatever treatment or service is currently being provided. In calculating the ICER of a new treatment, the difference in costs is divided by the difference in effects for the existing and new treatments (Campbell & Torgerson, 1999; Drummond, 1980). When the cost of adding the new treatment/service is outweighed by its ability to improve care, then it is considered to have

incremental cost-effectiveness (Campbell & Torgerson, 1999; Drummond, 1980; Strosahl, 2001). In this study we calculated ICERs for the experimental condition versus the control condition, and estimated face-to-face individual psychological care versus our experimental condition. Research has established that the pain severity subscale of the Multidimensional Pain Inventory is sensitive to change over time for interdisciplinary pain treatment programs (Wittink, Turk, Cark, Sukiennik, & Rogers, 2004); change that is well correlated with other established measures of pain, therefore this scale was used to determine the percent improvement that was used to calculate the ICERs. Clinical improvement was conceptualized as the percentage of participants in each condition that demonstrated a MPI pain severity change score, baseline to post-test, greater than the mean change ($M = -4.22$) found in a large multidisciplinary treatment study that explored the sensitivity to change of the MPI (Wittink, Turk, Cark, et al., 2004). Based on this criterion, 73% (11 out of 15 participants) of the experimental group demonstrated improvement compared to 7% (1 out of 15 participants) of the control condition. Because the criteria for improvement is based on the average change from the large multidisciplinary pain treatment study, and considering our need to be conservative when comparing potential incremental cost-effectiveness across hypothetical results it will be assumed that such face-to-face services would result in 100% improvement (Wittink, et al., 2004). The ICER of the www.treatyourpain.com compared to the not-for-profit National Pain Foundation's web-based control would be \$484.85; meaning that it would cost \$485 to gain the additional reduction in pain severity for older adults

(from 7% to 73% effective). The ICER for face-to-face care and the www.treatyourpain.com experimental condition is \$3,814.81; meaning that it would cost \$3,815 to gain the additional reduction in pain severity for older adults (from 73% to 100% effective). The potential relevance of these savings for clinical decision making is explored further in the discussion section.

Chapter 5

Discussion

Prospects

The development and evaluation of the www.treatyourpain.com intervention provided valuable information on attrition, hypothesized mechanisms of change, trends towards efficacy, and treatment acceptance. Our preliminary results challenge and extend those obtained in studies that have established the acceptability of chronic pain treatment for older adults when delivered in the standard psychological or multidisciplinary setting (Sorkin, Rudy, Hanlon, Turk, & Stieg, 1990; Keefe, Caldwell, Williams, Gill, Mitchell, Robertson, et al., 1990; Fry & Wong, 1991; Keefe & Williams, 1990; Arena, Hightower, & Chang, 1988; Arena, Hannah, Bruno, & Meador, 1991; Middaugh, Kee, Peters, & Herman, 1992; Middaugh, Woods, Kee, Harden, & Peters, 1991; Kerns, Turk, & Rudy, 1985; Cutler, Fishbain, Steel-Rosomoff, & Rossomoff, 1994). Our preliminary results also offer essential support and validity to those studies that have found efficacy for the Internet-based treatment for chronic pain (Buhrman, Faltenhag, Strom, & Andersson, 2004).

Limitations of the Evaluation of Trends

To better understand the impact of this treatment approach, trends toward efficacy were evaluated using a randomized feasibility trial design. An overall trend towards efficacy was clearly observed across a number of different outcome variables, with many different outcome variables obtaining statistically significant changes with large effect sizes over time. However, a number of methodological limitations were also identified (e.g., inadequate statistical power, small sample size (n = 30 total), restricted demographics of online sample, poorly quantified assessment of treatment adherence for the experimental condition and none for the control condition, lack of documented self-monitoring and incorporation of specific behavioral skills, lack of documented use of worksheets and handouts, and short time frame (6-weeks)). Also, the reader is also reminded of the limiting nature of investigating only the psychological component within the multi-component biopsychosocial model of chronic pain. We reiterate that all of the study findings must be considered in the context of and in perspective with the fluidity of the other unknown chronic pain factors, and that in this research study this context and perspective are not fully known. Below, we examine each a priori hypothesis, summarize our findings, and identify relevant methodological factors. Next, we propose possible solutions and ideas for future investigations.

Hypothesis 1: Movement Towards Efficacy on Health Status Variables

Pain Intensity, Pain Interference, Life Control, Affective Distress.

It was hypothesized that participants in the www.treatyourpain.com experimental condition would demonstrate greater improvements in health status

over time than individuals in the control condition. The preliminary results support that during the course of the intervention older adults participating in the experimental condition showed an improvement in health status when compared to those in the control condition. Statistically significant differences within change scores and interactions were found across reported pain intensity, pain related interference, affective distress, life control, and general psychological wellbeing. Furthermore, these significant differences had large effect sizes. Given the short time frame (6 weeks) and numerous intractable physical conditions causing individuals chronic pain conditions it is positive to see such large effect change associated with participation in the intervention. The literature identifies individuals pain profile based on their assessment by the Multidimensional Pain Inventory, this includes a dysfunctional pain profile (high pain severity, life interference, and affective distress, and lower levels of life control and activity), an adaptive coping pain profile pattern (the opposite of the dysfunctional pattern), and an interpersonally distressed profile (low levels of support from their environment; Turk, Okifuji, Sinclair, & Start, 1996; Turk & Rudy, 1990; Walter & Brannon, 1991). This is significant in that the preliminary results from this study suggest that the experimental brief, low-cost Internet based treatment seems to be able to substantially impact individuals pattern of responding to their pain experience and shift individuals from a dysfunctional profile associated with high levels of pain-related fear, anxiety, avoidance, disability, and depression (Asmundson, Norton, & Allardings, 1997; McCracken, Spertus, Janeck, Sinclair, & Wetzel, 1999) to a more adaptive pattern of responding to pain. Given the

consistent direction of the movement towards efficacy across these different health status variables it seems that the www.treatyourpain.com intervention was successful in providing skills and education in a delivery that allowed participants to access and incorporate the changes necessary to decrease pain intensity, while also reducing the negative emotional impact and psychological distress that is commonly a consequent to chronic pain (Asmundson, Norton, & Allerdings, 1997; McCracken, Spertus, Janeck, et al., 1999). An additional important individual difference amongst participants and their ability to demonstrate a shift in pain intensity arises from the source of an individual's chronic pain. One individual in the control condition reported pain caused by cancer, the literature on cancer pain shows that sometimes pain intensity is not reduced by pharmacological interventions, therefore, it was not expected that individuals with such pain would demonstrate significant movement across this variable (Gauthier, Rodin, Zimmerman, Warr, Moore, Shepherd, & Gagliese, 2009). Consistent with this, but not differing from general response trends in the control condition her weekly pain average was 6/10 at baseline and 6/10 at post-test. Given the small sample size, this may have diminished the change reported within that group. Future research may benefit from exploring the impact of pain cause or type on movement across outcome variables.

Consistent with extant literature as reviewed by Rudy, and colleagues (2002), this study found that participants receiving empirically supported cognitive behavioral pain management techniques were able to reduce their affective distress such as fear and depression. Participants in the experimental

condition greatly increased their reported sense of life control; an interesting correlate and perhaps confound, comes from the literature on older adults and computer use which has reported that simply the act of using a computer increases an individual's sense of personal control, life satisfaction, empowerment, and self-efficacy (Wright, 2000; Karavidas, Lim, & Katsikas, 2005; Shapira, Barak, & Gal, 2006). This finding reminds us of the multifactoral nature of conducting psychological research and highlights the potentially conflicting aspect of delivering treatment online: one cannot clearly attribute a shift on this health status variable to the treatment components alone; simply the act of spending time online, mastering the use of the computer and a new online service, may have skewed the positive results. Additionally, because the control group reported lower levels of satisfaction with the acceptability of the control condition, this may have impacted their engagement with the other help-seeking activities and resulted in a diminished report of life control. The literature has established that coping with chronic pain frequently results in a significant level of interference with an individual's professional and personal activities (Blyth, March, Brnabic, & Cousins, 2004; Elliott, Smith, Penny, Smith, & Chambers, 1999; McDermott, Toelle, Rowbotham, Schaefer, & Dukes, 2006; VonKorff & LeResche, 2005). This study found that the cognitive and behavioral techniques taught and delivered in the experimental condition were able to significantly decrease the reported levels of pain related interference. Such an effect is important because of the reciprocal nature of interference on functional status, a

key component of an older adults ability to maintain their independence (Lavsky-Shulan, et al., 1985; Rogers & Gwinn, 2002; Scudds & Robertson, 1998).

General Psychological Wellbeing. On a global measure of health that assessed general psychological wellbeing it was hypothesized that improved health status would be evidenced by higher ratings in a total score that represented an absence of distress across three life domains: 1) anxiety; 2) social dysfunction; and 3) loss of confidence, for older adults receiving the experimental condition (Goldberg & Williams, 1998). The data supported this hypothesis. Furthermore, these findings were consistent with the literature of chronic pain interventions that have found that psychological treatment improves quality of life and wellbeing (Fry & Wong, 1991; Miller & LeLievre, 1982; Pruder, 1988). Participants in the experimental condition reported higher levels of wellbeing at post-test than those in the control condition. The mean at post-test for the experimental condition was 11 on a scale of 12, reaching near the ceiling of response options. Differences in wellbeing were statistically significant across time, between groups, and had a significant interaction effect. Moreover, each of these differences was supported by a large effect size.

Hypothesis 2: Skill Acquisition and Health Promoting Behaviors

It was hypothesized that participants in the experimental condition would demonstrate greater improvement in use of coping skills, behavioral skills, and adoption of health promoting behaviors than those in the control condition. The preliminary results provided support for the experimental condition demonstrating more improvement over time than the control condition. Statistically significant

change scores and group by time interactions were found across all coping skills, behavioral skills, and all health promotion behaviors including increased activity, increased engagement, and a reduction in medication use. Furthermore, these significant differences had large effect sizes. The data support extant literature that has found instantiation of new coping skills and behavioral activation are correlated with reduced reports of pain severity (Buhrman, Faltenhag, Strom, & Andersson, 2004; Richardson, Ness, Doleys, Banos, Clanfrini, & Richards, 2009). Catastrophizing, whether conceptualized as either a coping strategy or a cognitive appraisal, is an empirically validated construct (Geisser, Robinson, Keefe, & Weiner, 1994; Hill, Niven, & Knussen, 1995). Consistent with a large body of research, older adults receiving the cognitive behavioral experimental condition significantly reduced their level of catastrophic thinking compared to those in the control group (Geisser, et al., 1994; Hill, et al., 1995; Keefe, et al., 1999). The data provided strong support for the experimental condition improving the frequency of adaptive coping skill implementation by participants compared to the control group. The data supported that skill deficits were prominent in this older adult pain population at baseline and that eHealth interventions focused on skill building and education produce increased acquisition and use of skills to better cope with pain. These findings suggest that during the 6-week intervention skill mastery was acquired, as the questionnaires assessed how frequently individuals were actually using the various cognitive and cognitive behavioral strategies. These findings are consistent with the high rate of competency reported by experimental participants at the end of each specific module; these

will be discussed later in this section. However, it is a limitation of this study that a more informative and sensitive measure of competency was not used.

Therefore, future research is needed to determine which components of this intervention most significantly impacted individual's instantiation of the treatment components and should include a reliability check to see how adherent the individuals were in their knowledge and implementation of coping skills.

Pain with ambulation is highly correlated with disengagement and poorer quality of life in existing studies of older adults functional activity (Ling, Xue, Simonsick, Tian, Bandeen-Roche, Fried, & Bathon, 2006; Sarkisian, Prohaska, Davis, & Weiner, 2007; Sliwinski & Sisto, 2006; Takata, Ansai, Soh, Awano, Yoshitake, Kimura, Sonoki, et al., 2010). Consistent with those findings and as hypothesized by these researchers, participation in the experimental condition resulted in a significant reduction in disengagement from personal and professional activities and a decrease in pain when ambulating. Older adults in the control condition did not demonstrate any diminished pain associated with ambulation, which may have resulted in the lack of increased engagement in functional activities. In a review of 12 outcome studies using cognitive and behavioral interventions for chronic pain treatment in the elderly, it was found that the interventions were effective on self-reported pain experiences, but less so on symptoms of depression, physical functioning, and medication use (Lunde, Nordhus, & Pallesen, 2009). This study offers a valuable contribution to empirical reviews such as that just mentioned, and the scientific community's

efforts to demonstrate the empirically validated nature of cognitive and behavioral treatment for chronic pain.

The literature has shown that an important consequent of reduced medication use is increased up time, increased engagement, and an improvement in functional activity (Hanlon, Guay, & Ives, 2005). Older adults commonly receive pharmacological treatment for pain from their primary care physician (Cooner & Amorosi, 1997; AGS Panel on Chronic Pain in Older Persons, 1998; AGS Panel on Persistent Pain in Older Persons, 2002). However, while pharmacologic treatments may bring rapid relief to older adults living with pain, chronic consumption of pharmacological agents results in further health incursions (Fishman, & Teichera, 2003). Consistent with the hypotheses of this study, and with findings from the literature (Kabela, Blanchard, Appelbaum, & Nicholson, 1989), older adults in the experimental condition reduced both the average number of days per week the consumed over-the-counter and prescription pain medication at rates that were significantly different from individuals in the control condition. The data gathered by this study did not evaluate the specific medications being used by participants, only that they were specifically consumed to treat their chronic pain. Because the specific type of pharmacologic agent is unknown, a more subtle exploration of the impacts of reducing certain types of medications (e.g., narcotic, antidepressant, neuroleptic, etc) cannot be conducted. This is a limitation of this study, future research would benefit from ensuring more specific knowledge about medication types be included in assessment and analysis.

Hypothesis 3: Treatment Acceptance

We hypothesized that participants in the www.treatyourpain.com condition would report higher levels of treatment acceptance than controls. Data collected via the Client Satisfaction Questionnaire (CSQ) appear to support this hypothesis. Comparisons of the percentages of responses between the experimental group and control showed important differences in the acceptability and satisfaction of the interventions. As shown in Table 3, the majority of individuals in the experimental condition liked the service they received, got what they wanted, had their needs met, would recommend the service to others, got enough help, were able to deal more effectively with their problems, were generally very satisfied, and would return to the service. Individuals in the control condition found it less satisfying, less helpful, had fewer of their needs met, wouldn't recommend it as much, didn't get enough help, didn't get what they wanted, were indifferent about the service, and wouldn't come back. Differences in acceptance ratings between groups were statistically significant. Positive appraisals of the intervention were further substantiated with a zero attrition rate. However, it is important to note that CSQ ratings were gathered from a reasonably small and select group of highly motivated, moderately to highly educated, and moderate to high socioeconomic status participants. This niche demographic is referred to in the literature as the "wired seniors" (Czaja, Charness, Fisk, et al., 2006). Strategies for expanding the experimental sample demographics are discussed in the future research section below.

At the conclusion of each module, participants in the experimental condition also provided feedback about how effective, engaging, and acceptable they rated each module. Based on the feedback from these questions, it appears that www.treatyourpain.com could be most improved by delivering information more effectively, and in regards to the “emotion” and “building your community” modules also making that material more engaging (information included in Table 3.). This information is very helpful for future research. While the data gathered regarding mastery of the material from each module is somewhat bereft, an overall score of how many of three review questions at the end of each module participants responded correctly to was provided as a brief measure of adherence/competency. Generally, participants were able to correctly respond to these review questions with 100% accuracy. There were eight individuals who responded incorrectly to one question throughout the entire intervention. While the content of these questions had face validity, and in no way were written to be challenging or deceptive, it is encouraging that individuals appeared to be retaining the information that they learned throughout the modules, which were at time lengthy and intensive. These data are consistent and supports the reliability of participant responses to the Client Satisfaction Questionnaire. These findings generally suggest that the website was easy enough to use and learn in order to be impactful. Strategies and possible modifications to www.treatyourpain.com that could address these shortcomings will be discussed in the future research section below.

Additional Project Goals

Effect Size, Power, and Sample Size

An additional goal of this small sample feasibility pilot study was to determine the likely effect size of this new treatment and use this information to determine sample sizes needed for an RCT. Based on standards for psychological and health sciences research (Keppel, 1991), across the outcome health status variables the effect sizes associated with significant group by time interaction for pain intensity, pain related interference, pain related affective distress, pain related level of life control, and general psychological wellbeing, were all large. While the effect sizes were all high for significant findings, a post-hoc power analysis on key outcome variables established that any future randomized control trial should have a number per group of an estimated 150 per cell to achieve a power of .80, as recommended by the field of psychological research (Keppel, 1991; Tabachnik & Fidell, 2001). Given the small number of 30 participants for this study, the numerous significant preliminary results should be interpreted with some caution. Future research should include sample sizes based on these recommendations.

Cost-effectiveness Data

There are a number of important considerations when discussing these Incremental Cost-Effectiveness Ratios (ICERs) that we will consider below: 1) are we comparing the right strategies/treatments; 2) is the effectiveness data valid and reliable; 3) is this effectiveness data representative of broader samples and

treatment settings; 4) is the cost data accurate; and 5) will this information improve clinical decision making/policy decision making?

The choices to look at the ICER of the www.treatyourpain.com experimental condition web-based control representing what older adults may access from reputable sources online seems to be a valid and useful comparison of the present intervention's potential to offer clinically significant improvements for what is currently a reasonably low cost (\$485) which could be substantially lower if the number of users increased. The comparison between the experimental condition and the face-to-face multidisciplinary pain treatment program is somewhat more dubious. It was provided to offer insight into the potentially significant cost-savings of offering advanced behavioral health solutions online; however, there may be many different intermediary treatment options between the two that have not been explored in these comparisons. Future research should include alternative treatments that may be of financial and clinical interest to clinicians, such as chronic pain groups, or face-to-face care supplemented with online support.

The effectiveness data was selected for the current study based on data available that was clinically relevant (changes in pain intensity ratings) as well as empirically established to be sensitive to change and reliable (Wittink, Turk, Cark, Sukiennik, & Rogers, 2004). The use of the change score was derived from a large study that meets such criteria; however, the choice to use the percentage demonstrating a shift in pain intensity scores equal or above that was dictated by post-hoc availability of theoretically appropriate data. While the comparisons

between the two conditions involved in this study meet guidelines for calculations of ICER; generally there is a measure of increase quality of life years (IQLY) used in both trials if an ICER is to be calculated between a treatment in one study and a treatment used in another study. Given that we did not have access to the quality of life measure, using the established Multidimensional Pain Inventory with established change scores seemed the best alternative for this theoretical exploration of cost-effectiveness.

Given the demographics of the sample that participated in this research study are a somewhat unique group of “wired seniors” who are highly motivated, of moderate to high financial status, have moderate to high levels of education, and are competent to access and use technology it may be that the effectiveness of the experimental condition is being overestimated. Future research should broaden the implementation of the www.treatyourpain.com intervention to a more widespread community sample using multiple site entry advertising (Reips, 2000). It is important that consideration of the ICERs reported in this study not be overly generalized to all older adults with chronic pain.

The measurement of the cost of service delivery was well known for the www.treatyourpain.com experimental condition and given that the control condition is a free-public access website it can be assumed to have \$0 cost. However, this \$0 price-tag is clearly misrepresented, there is development costs associated with this website that should be considered into future analyses. They were not considered in this analysis because of lack of access to costs and the cost to use this service for this intervention was in fact zero dollars.

Furthermore, the cost data for the experimental condition is negatively skewed because of the fact that it would decrease for every additional user. Situations in which more utilization does not equal more money are unusual; such a decrease in cost would present an even more favorable ICER for the experimental www.treatyourpain.com service. An additional concern in the present study is that the face-to-face treatment costs are modeled, not measured, in real practice. There is a wide array of psychological services to treat chronic pain and the cost for this analysis was simply the common national US average cost per hour; this fee could easily go up or down if the type of service was modeled differently (Strosahl, 2001). Therefore, the ICER for the face-to-face care and the www.treatyourpain.com care could either increase or decrease based on inclusion of a different model of care.

The ICER conducted in this study finds clear and substantial trends suggesting that the www.treatyourpain.com experimental intervention is cost-effective compared to the control condition and compared to the empirically supported face-to-face individual care. However, given how responsive the ICER calculation is to the above-mentioned factors, how much these findings can be used in policy decision-making and personal clinical decision-making is unclear. Future research should work to reduce the variability and skew in the aforementioned factors thereby strengthening any additional trends toward effectiveness. However, with all of these limitations in place, this study offers an innovative effort into beginning to calculate and document the cost-effectiveness of a low-cost empirically based chronic pain treatment. Literature has

established chronic pain to be a health problem that has substantial impact on service utilization and frequently results in costly secondary mental and physical health problems (Strosahl, 2001). Furthermore, cost-effectiveness researchers have highlighted the problematic reliance on costly procedures for pain management such as neurosurgery (Strosahl, 2001); this study offers an empirically supported alternative to such medical decisions, taking this initial ICER data into consideration should be a first step for further research.

Future Research: Opportunities of Treatment Design and Implementation

Chronic pain in older adults is a significant public health problem (AGS Panel on Chronic Pain in Older Persons, 1998; Blyth, March, Brnabic, & Cousins, 2004; Harkins, 2002; McDermott, Toelle, Rowbotham, Schaefer, & Dukes, 2006; Morlin, et al., 2008; Wan, Sengupta, Velkoff, & De Barros, 2005). This study aimed to develop a treatment approach that could address the limitations of existing care, including high cost, limited access, and limited efficacy (Ardrey, Herr, Titler, Sorofman, & Schmitt, 2003; Robinson, 2007; Landi, Onder, Cesari, et al., 2001; Wan, et al., 2005 ; Won, Lapane, Gambassi, et al., 1999; Sengstaken & King, 1993). The preliminary analysis of the web-based stand-alone treatment approach, www.treatyourpain.com, appears to be a promising tool that may offer a low-professional-involvement website to reduce the economic and psychosocial burden of the rising chronic pain epidemic. This feasibility trial suggests that this eHealth intervention may provide an effective tool for assisting older adults to reduce the pain and burden associated with self-management of chronic pain. Given the scope of the current epidemic, such a cost-effective

approach may offer substantial promise for future care. Below, we discuss some relevant modifications to the current web-based program based on the lessons learned from this pilot study and present some ideas for expansion and implementation of this tool into a stepped-care approach to chronic pain treatment.

In the current study, the initial response rate using single-site advertising was high enough to easily obtain our pre-determined sample size. The most significant point of attrition was following potential participant's first access of the information home page for the study. This page listed the inclusion criteria and required users to click on a button requesting more information. We did not gather data from these individuals; therefore, we can only explore hypothetical explanations as a means of reducing attrition for future research. Not having data collected from the "drop outs" or non-continuing users is a limitation of the study; as research has established (Fife-Schaw, 1995) any systematic differences amongst those potential participants remains unquantified and therefore the potential impact of those differences on the preliminary results of this study are also unknown. There is a good chance that individuals came to the website after viewing advertisement and simply did not meet inclusion criteria (such as pain duration or age). In this case, while unfortunate that such a large percentage of initially interested individuals declined to participate, it may have been a concise version of the frequent process of initial self-selection due to inclusion criteria seen in much psychological research. Furthermore, this initial and steep attrition curve may have resulted in a rapid leaning down of the sample

to include only the “hardcore users” who were most likely to remain and complete the study requirements (Eysenbach, 2005). Literature exploring the restrictions and parameters of conducting online research conclude that while self-selection bias is problematic because it restricts the target population, given the required voluntary nature of psychological research, there is little that can be done to eliminate the bias itself (Reips, 2000). Instead, Reips (2000) recommends that researchers use multiple site entries (advertise across a variety of different online communities/resources) to ensure they are sampling from the broadest possible online and target populations; this research study would have been strengthened by abiding by such a research guideline. Future studies should ensure that their sample is as broad as possible, and the impact of and potential self-selection bias minimized, by advertising and recruiting from multiple online sites.

Other improvements to the website homepage could be made that may improve the chance of reducing such attrition. These include ensuring that the homepage is more user friendly, incorporating only the minimum information necessary to meet ethical guidelines and displaying that information in a way that motivates and excites potential users, encouraging them to agree to participate. Based on restrictions from this studies Office of Human Research Protection, the information could be considered both verbose and uninspiring to potential users. Successful Internet treatment programs often incorporate a site preview; notable examples include www.theacpa.org and www.pain.com. The American Chronic pain Association (www.theacpa.org) provides a multimedia flash video presentation highlighting website characteristics on their homepage. The online

resource www.pain.com, which serves both health consumers and professionals, includes an overview of content topics, flash video overview of new and upcoming services and events. While offering such a preview poses a risk for contamination of active treatment components across user groups, future studies may benefit from offering testimonials about the treatment in a creative way that minimizes this risk.

Another hypothesized explanation for the high attrition pre-consent is that individuals searching for information about chronic pain treatment in older adults were not the older adults themselves. It could be easily assumed that a younger family member or significant other was the one looking for recommendations or services on how to assist their older family member or friend suffering from pain. Of course, these individuals would not have met inclusion criteria to continue with the website. Again, the unknown quality of the discontinued user is a limitation of this study. If this scenario is correct, and the rates of such support persons searching are quite high, then it may of potential future value to develop a site targeted to caregiving/support for chronic pain in older adults.

It is also possible that users met inclusion criteria but were dissuaded from continuing due to the burden of completing baseline and post-test questionnaires, as well as the potential to be randomized into the control condition. While efforts were made to minimize burden through selecting short and easy to complete questionnaires, future study may work to further reduce the time required. If potential users evaluated the control condition as less desirable, and this contributed to attrition, future studies could describe the control condition

in a way that left potential users believing that getting randomized to either of the two conditions would offer benefits and valuable services. Given that preliminary results of this study established the experimental condition to have improved outcomes more significantly than the website control condition; future studies may benefit from allowing the participants in the control condition to engage in the experimental condition after being in a wait-list group for six-weeks.

Given how well participants in the experimental condition improved their coping ability, functional status, and decreased their reported pain severity against individuals accessing the control website; future research is needed to compare this intervention to a stronger control. While it is common in eHealth literature to evaluate an innovative Internet intervention against a non-tailored information only control (Wanner, Martin-Diener, Braun-Fahrlander, Bauer, & Martin, 2009), looking forward to the goals of future research, or additional cost-effectiveness studies, it may be productive to compare this experimental condition to an empirically supported face-to-face multidisciplinary control condition. This more rigorous study would better evaluate the preliminary efficacy established by this study. Control condition participants were given the instructions “For the duration of the study you will be asked to review the materials included in this website. Please take your time and use these resources as recommended by the website. You may continue to access these resources by logging in and logging out at www.treatyourpain.com. We hope you find the information useful. At the conclusion of the study you will be asked to fill out post-study questionnaires. Thank you!” However, given the lack of ability to

track user time within that website, no data beyond the fact that they logged in to the control website could be gathered. While individuals reported overall lower levels of acceptability and satisfaction with the control condition website, they did continue to sign in and access that website at least once a week. Such adherence is a sign that the information was beneficial to them in some way or another; the fact that we cannot clearly state why is a weakness of the design of the present study. Data established that individuals in the control condition accessed the material infrequently (rarely more often than once a week). Furthermore, the control condition participants commonly did not log in to the website until the day of receiving the administrators email prompt. While this prompt also spurred the majority of experimental participants to access that website, this would often result in a number of sequential days of logging in. Clearly, the lack of oversight and control researchers had over participant use of the control website was a limitation of the current study and should be addressed in any future research efforts.

Literature differs on whether additional contact, such as that of the weekly reminder emails, offers additive benefit to the treatment. Some research suggests that additional contact increases comprehensive use of web-services as well as encourages retention and increased competency through feedback and support (Goritz, & Stieger, 2009; Woodall, Buller, Saba, Zimmerman, Waters, Hines, Cutter, & Starling, 2007). However, another study found that the addition of phone contact to an online treatment service offered little to no benefit (Andersson, Lundstrom, & Strom, 2003). The present study had very minimal

email contact with users; this was partly through empirical interest in a minimal contact study design and partly due to practical programming and Institutional Review Board restrictions. It is certainly thought to be an area that could enhance future interventions, and would be expected to improve adherence, increase motivation, and add a valuable dimension to any web-based service. However, the fact that participants in this study demonstrated such movement towards efficacy as well as 100% retention suggests, somewhat in difference to established literature (Nijland, van Gemert-Pijnen, Boer, Steehouder, & Seydel, 2008; Woodall, Buller, Saba, et al., 2007), that such services can be impactful with a minimal contact low support design.

Future directions should consider how this minimal contact intervention might be used within a stepped care model of health care delivery. Given the treatment burden placed on physicians within primary care service to treat the majority of older adults coping with chronic pain (Cooner & Amorosi, 1997), and that what is frequently provided in that treatment setting are pharmacological intervention which may incur further health problems (Fishman & Teichera, 2003), offering a service such of this intervention from that setting might offer a valuable step to primary care. Given the low-cost and ease of use, this intervention could also be used to provide initial basic treatment to older adults. If being monitored by their primary care physician for progress, it would be efficient to then step up the care, to a more costly face-to-face service, for those individuals not responding to the treatment. It is an interesting consideration and

offers insight into the numerous, flexible ways that such an eHealth service can offer widespread mental and physical health benefits.

The data suggested that the weakest areas of the web-based intervention were in the effectiveness of module delivery, and for the “community” module how engaging the material was. These two issues should be addressed in future research by making some modifications to the content, design, layout, and programming of the web-based service. Given site-review by an expert in the psychological treatment of chronic pain was conducted prior to launching this intervention, it was known a priori that the content of the website was appropriate and useful. However, the researchers were bound by financial and resource restriction in their ability to use the most cutting edge web-based design features; some of which may have allowed the material to be delivered more effectively. These could include the use of streaming video and flash based technologies to have more information delivered verbally or visually and result in a product that is overall less reliant on written content. While the current study developed numerous quality handouts/worksheets that were recommended for download. These sheets may never have been printed, nor completed, potentially reducing the effectiveness of the overall module. If participants did not use the handouts/worksheets in conjunction with going through the website, this would have diminished their ability to incorporate the information due to potential lack of relevance, generalizability, and lack of skill building through repetition and rehearsal.

Use of innovative novel web-design tools may have also made the modules more engaging. Indeed, the “building your community” module that one participant gave a “fair” engaging rating to did not incorporate any video links, audio tools, nor very many images. Consequently, the module may have felt static in a way that left the participant somewhat bored or disengaged. An additional factor in how the modules were designed was based on how the layout was restricted by programming specifications. If additional financial resources could be allocated to programming time, future web-based treatment development could enhance both the structure and depth of the site.

This study confirmed many of the hypothesized direct benefits to participants, as well as the potential benefits to science, society, and the larger class of older adults living with chronic pain. Preliminary results of this study suggest that the benefits of the experimental condition seem to outweigh those of the control. This study extends the literature suggesting that empirically supported cognitive behavioral pain reduction and management techniques increase pain related coping and overall functioning in older adults (Rudy, Hanlon, & Markham, 2002).

In consideration of the benefits to science, the preliminary results of the current study suggest that www.treatyourpain.com offers an easily accessible and lower-cost empirically supported intervention. This research offers important confirmation that such treatment can be effectively delivered over the Internet. When considering the benefit to the larger class of older adults and those that care and support them, the initial findings of this study suggest that this low-cost

and empirically supported alternative to face-to-face care is acceptable, engaging, and effective. Participant care and psychological wellbeing was of paramount concern to the researchers. Therefore it is of additional importance that there were no problems with delivering the treatment over the Internet, no participants were put at risk, and no ethical violations occurred. Such a successful delivery of Internet based treatment encourages these and other researchers to continue to expand and enhance the delivery of empirically supported cognitive behavioral techniques online.

This study adds evidence that an Internet-based chronic pain treatment program tailored specifically to the needs of older adults is both plausible and accessible as a first line of treatment for individuals interested and highly motivated to access such services online. Future research is needed to establish how well such a service performs with individuals more financially restricted or who are known to have barriers to accessing the Internet or other multidisciplinary care.

References

- American Geriatrics Society (AGS) Panel on Chronic Pain in Older Persons. (1998). The management of chronic pain in older persons: American Geriatrics Society. *Journal of American Geriatrics Society, 46*, 635-651.
- American Geriatric Society (AGS) Panel on Persistent Pain in Older Persons. (2002). The management of persistent pain in older persons: American Geriatrics Society. *Journal of American Geriatrics Society, 50*, June Supplement.
- Andersson, G., Lundstrom, P., & Strom, L. (2003). Internet-based treatment of headache: Does telephone support contact add anything? *Headache, 43*, 353-361.
- Arderly, G., Herr, K.A., Titler, M.G., Sorofman, B.A., & Schmitt, M.B. (2003). *Assessing and managing acute pain in older adults: A research base to guide practice*. MEDSURG Nursing, 12(1), 7-18.
- Arena, J., Hightower, N., & Chang, G. (1988). Relaxation therapy for tension headache in the elderly: A prospective study. *Psychology and Aging, 3*, 96-98.
- Arena, J., Hannah, S.L., Bruno, G.M., & Meador, K. (1991) Electromyographic biofeedback training for tension headache in the elderly: A prospective study. *Biofeedback and Self-Regulation, 16*, 379-390.
- Blozik, E., Stuck, A.E., Niemann, S., Ferrel, B.A., Harari, D., von Renteln-Kruse, W., et al., (2007). Geriatric Pain Measure Short Form: Development and initial evaluation. *Journal of American Geriatrics Society, 55*, 2045-2050.

- Bonica, J. (1990). *Management of Pain, 2nd Ed.* Philadelphia: Lee & Feibiger.
- Bower, P. (2005). Stepped care in psychological therapies: Access, effectiveness, and efficiency. *The British Journal of Psychiatry, 186*, 11-17.
- Bradley, L.A., & McKendree-Smith, N.L. (2001). Assessment of psychological status using interviews and self-report instruments. In D.C. Turk & R. Melzack (Eds), *Handbook of Pain Assessment, 2nd Edition*, (pp. 292-319). New York: The Guilford Press.
- Briggs, A.H., Wonderling, D.E., & Mooney, C.Z. (1998). Pulling cost-effectiveness analysis up by its bootstraps: A non-parametric approach to confidence interval estimation. *Econometrics and Health Economics, 6*(4), 327-340.
- Burhman, M., Galtenhag, S., Strom, L., & Andersson, G. (2004). Controlled trial of internet-based treatment with telephone support for chronic back pain. *Pain, 111*, 368-377.
- Campbell, M.K., & Torgerson, D.J. (1999). Bootstrapping: Estimating confidence intervals for cost-effectiveness ratios. *Quantitative Journal of Medicine, 92*, 177-182.
- Cleeland, C.S., Gonin, R., Hatfield, A.K., et al. (1994) Pain and its treatment in outpatients with metastatic cancer. *New England Journal of Medicine, 330*, 592-596.
- Cleeland, C.S., & Syrjala, K.L. 1992, How to assess cancer pain. In D.C. Turk, R. Melzack eds. *Handbook of Pain Assessment*. New York: Guilford Press, pp 362-387.

- Cooner, E., & Amorosi, S. (1997). *The Study of Pain and Older Americans*. New York: Louis Harris and Associates.
- Cutler, R.B., Fishbain, D.A., Steele-Rosomoff, R., & Rossomoff, H.L. (1994). Outcomes in treatment of pain in geriatric and younger age groups. *Archives of Physical Medicine and Rehabilitation, 75*, 457-464.
- Czaja, S.J., Charness, N., Fisk, A.D., Hertzog, C., Nair, S.N., Rogers, W.A., & Sharit, J. (2006). Factors predicting the use of technology: Findings from the center for research and education of aging and technology enhancement (CREATE). *Psychology and Aging, 21*(2), 333-352.
- Devineni, T., & Blanchard, E.B. (2004). RCT of an internet-based treatment for chronic headache. *Behavior Research and Therapy, 43*, 277-293.
- Drummond, M.F. (1980). *Principles in economics appraisal in health care*. Oxford: Oxford University Press.
- Eysenbach, G. (2005). The law of attrition. *Journal of Medical Internet Research, 7*(1), e11.
- Ferrell, B.A., Stein, W.M., & Beck, J.C. (2000). The geriatric pain measure: Validity, reliability, and factor analysis. *Journal of American Geriatric Society, 48*, 1669-1673.
- Ferrell, B.A. (1995). Pain evaluation and management in the nursing home. *Annals of Internal Medicine, 123*, 681-687.
- Fife-Shaw, C. (1995). Survey and sampling issues. In G.M. Breakwell, S. Hammond, & C. Fife-Schaw (Eds.), *Research methods in psychology* (pp. 99-115). London: Sage.

- Fishman, S.M., & Teichera, D. (2003). Challenges and choices in drug therapy for chronic pain. *Cleveland Clinical Journal of Medicine*, 70(2), 119-121.
- Fry, P.S., & Wong, P.T.P. (1991). Pain management training in the elderly: Matching interventions with subjects' coping styles. *Stress Medicine*, 7, 93-98.
- Gagliese, L., & Melzack, R. (1997). Age differences in the quality of chronic pain. *Pain Research and Management*, 2, 157-162.
- Gagliese, L. (2001). Assessment of pain in elderly people. In D.C. Turk & R. Melzack (Eds). *Handbook of Pain Assessment*, 2nd edition. New York: Guilford Press (119-133).
- Gatchel, R.J., & Turk, D.C. (1996). *Psychological approaches to pain management: A practitioner's handbook*. New York: Guilford Press.
- Gauthier, L.R., Rodin, G., Zimmerman, C., Warr, D., Moore, M., Shepherd, F., & Gagliese, L. (2009). Acceptance of pain: A study in patients with advanced cancer. *Pain*, 143(1-2), 147-154.
- Geisser, M.E., Robinson, M.E., Keefe, F.J., & Weiner, M.I. (1994). Catastrophizing, depression, and the sensory, affective and evaluative aspects of chronic pain. *Pain*, 59, 79-83.
- Goldberg, D.P., & Williams, P. (1998). *A User's Guide to the GHQ*. NFER-Nelson: Windsor.
- Goldberg, D.P., Gater, R., Sartorius, N., Ustun, T.B., Piccinelli, M., Gureje, O., & Rutter, C. (1997). The validity of two versions of the GHQ in the WHO

study of mental illness in general health care. *Psychological Medicine*, 27, 191-197.

Goritz, A.S., & Stieger, S. (2009). The impact of field time on response, retention, and response completeness in list-based Web surveys. *International Journal of Human-Computer Studies*, 67(4), 342-348.

Haaga, D. (2000). Introduction to the special section on stepped care models in psychotherapy. *Journal of Consulting and Clinical Psychology*, 68(4), 547-548.

Hanlon, J.T., Guay, D.R.P., & Ives, T.J. (2005). Oral analgesics: Efficacy, mechanism of action, pharmacokinetics, adverse effects, drug interactions, and practical recommendations for older adults. In S.J. Gibson & D.K. Weiner (Eds.), *Pain in older persons. Progress in pain research and management* (Vol. 35, pp. 205-222). Seattle: IASP Press.

Harkins, S.W. (2002). What is unique about the older adult's pain experience? In D.K. Weiner, K. Herr, & T.W. Rudy (Eds.) *Persistent Pain in Older Adults: An Interdisciplinary Guide to Treatment*. New York: Springer Publishing Company, pp. 4-17.

Hayes, S.C., Barlow, D.H., & Nelson-Gray, R.O. (1999). *The scientist practitioner: Research and accountability in the age of managed care*, 2nd ed. Boston: Allyn and Bacon.

Hill, A., Niven, C.A., & Knussen, C. (1995). The role of coping in adjustment to phantom limb pain. *Pain*, 62, 79-86.

- Hiskey, S., & Troop, N.A. (2002). Online longitudinal survey research: Viability and participation. *Social Science Computer Review*, 20, 250-259.
- Kabela, E., Blanchard, E.B., Appelbaum, K.A., & Nicholson, N. (1989). Self-regulatory treatment of headache in the elderly. *Biofeedback & Self Regulation*, 14(3), 219-228.
- Keefe, F.J. (1996). Cognitive behavioral therapy for managing pain. *The Clinical Psychologist*, 49(3), 4-5.
- Keefe, F., & Williams, D. (1990). A comparison of coping strategies in chronic pain patients in different age groups. *Journal of Gerontology*, 45, 161-165.
- Keefe, F.J., Caldwell, D.S., Williams, D.A., Gil, K.M., Mitchell, D., Robertson, C., et al., (1990). Pain coping skills training in the management of osteoarthritic knee pain---II: Follow-up results. *Behavior Therapy*, 21, 435-447.
- Keefe, F.J., Caldwell, D.S., Baucom, D., Salley, A., Robinson, E., Timmons, K., Beaupre, P., Weisberg, J., & Helms, M. (1999). Spouse-assisted coping skills training in the management of knee pain in osteoarthritis: Long-term followup results. *Arthritis Care and Research*, 12(2), 101-111.
- Kelley, M., Heffer, R., Gresham, F., & Elliot, S. (1989). Development of a modified treatment evaluation inventory. *Journal of Psychopathology and Behavioral Assessment*, 11, 235-247.
- Keppel, J. (1991). Chapter 4: The sensitivity of an experiment: Effect size and Power. In, *Design and Analysis A Researcher's Handbook*, 3rd Edition, (pp. 62-91). New Jersey: Prentice Hall.

- Kerns, R.D., Turk, D.C., & Rudy, T.E. (1985). The West Haven-Yale Multidimensional Pain Inventory (WHMPI). *Pain, 23*, 345-356.
- Kerns, R.D., Otis, J., Rosenberg, R., & Reid, M.C. (2003). Veterans' reports of pain and associations with ratings of health, health-risk behaviors, affective distress, and use of the healthcare system. *Journal of Rehabilitative Research and Development, 40*(5), 371-379.
- Lavsky-Shulan, M., Wallace, R.B., Kohout, F.J., Lemke, J.H., Morris, M.C., & Smith, I.M. (1985). Prevalence and functional correlates of low back pain in the elderly: The Iowa 65+ rural health study. *Journal of the American Geriatrics Society, 33*, 23-38.
- Ling, S.M., Xue, Q.L., Simonsick, E.M., Tian, J., Bandeen-Roche, K., Fried, L.P., & Bathon, J.M. (2006). Transitions to mobility difficulty associated with lower extremity osteoarthritis in high functioning older women: Longitudinal data from the Women's Health and Aging Study II. *Arthritis & Rheumatology, 55*(2), 256-263.
- Lunde, L., Nordhus, I.H., & Pallesen, S. (2009). The effectiveness of cognitive and behavioural treatment of chronic pain in the elderly: A quantitative review. *Journal of Clinical Psychology in Medical Settings, 16*(3), 254-262.
- Rudy, T.E., Hanlon, R.B., & Markham, J.R. (2002). Psychosocial issues and cognitive-behavioral therapy: From theory to practice. In D.K. Weiner, K. Herr, & T.E. Rudy (Eds.), *Persistent Pain in Older Adults: An Interdisciplinary guide for Treatment*, (pp. 58-94). New York: Springer Publishing Company.

- Marks, I.M., Cavanagh, K., & Gega, L (2007). *Hands-on Help: Computer-aided Psychotherapy*. New York: Psychology Press.
- McNamara, C., et al., (2002). *Setting the stage: An introduction to NIDA's stage model for behavioral treatment development research*. Symposium presented at the Annual Meeting of the Association for the Advancement of Behavior Therapy, Reno: NV.
- Melzack, R. (1987). The short-form McGill Pain Questionnaire. *Pain*, 30, 191-197.
- Mercer, V.E., & O'Donohue, W.T. (in progress). Assessment of older adults pain management needs.
- Middaugh, S.J., Kee, W.G., Peters, J., & Herman, K. (1992). Physiological response of older and younger pain patients to biofeedback-assisted relaxation training. *Biofeedback and Self-Regulation*, 17, 304-305.
- Middaugh, S.J., Woods, S.E., Kee, W.G., Harden, R.N., & Peters, J. (1991). Biofeedback-assisted relaxation training for the aging chronic pain patient. *Biofeedback and Self-Regulation*, 16, 361-377.
- Miller, C., & LeLievre, R.B. (1982). Method to reduce chronic pain in elderly nursing home residents. *Gerontologist*, 22, 314-317.
- MMWR, (2004). Update: Direct and indirect costs of arthritis and other rheumatic conditions---Unites States, 1997. *MMWR*, 53, 338-339.
- Morley, S., & Williams, A.C. (2002). Conducting and evaluating treatment outcome studies. In D.C. Turk & R.J. Gatchel (Eds.), *Psychological*

Approaches to Pain Management: A Practitioner's Handbook, 2nd Edition (pp. 52-68). New York: Guilford Press.

- Nijland, N., van Gemert-Pijnen, J., Boer, H., Steehouder, M.F., & Seydel, E.R. (2008). Evaluation of Internet-based technology for supporting self-care: Problems encountered by patients and caregivers when using self-care applications. *Journal of Medical Internet Research, 10*(2), 55-64.
- Pruder, R.S. (1988). Age analysis of cognitive-behavioral group therapy for chronic pain outpatients. *Psychology and Aging, 3*, 204-207.
- Reips, U.D. (2000). The web experiment method: Advantages, disadvantages, and solutions. In M. Birnbaum (Ed.), *Psychological experiments on the Internet* (pp. 89-117). London: Academic Press.
- Richardson, E.J., Ness, T.J., Doleys, D.M., Banos, J.H., Cianfrini, L., & Richards, J.S. (2009). Depressive symptoms and pain evaluations among persons with chronic pain: Catastrophizing, but not pain acceptance, shows significant effects. *Pain, 147*(1-2), 147-152.
- Rogers, J.C., & Gwinn, S.M.G. (2002). Functional assessment and outcomes. In D.K. Weiner, K. Herr, and T.W. Rudy (Eds.) *Persistent Pain in Older Adults: An Interdisciplinary Guide to Treatment*. New York: Springer Publishing Company, pp. 133-159.
- Rudy, T.W., Hanlon, R.B., & Markham, J.R. (2002). Psychosocial issues and cognitive-behavioral therapy: From theory to practice. In D.K. Weiner, K. Herr, and T.W. Rudy (Eds.) *Persistent Pain in Older Adults: An*

Interdisciplinary Guide to Treatment. New York: Springer Publishing Company, pp. 58-94.

Scudds, R., & Robertson, J.M. (1998). Empirical evidence of the association between the presence of musculoskeletal pain and physical disability in community-dwelling senior citizens. *Pain*, 75, 229-235.

Sarkisian, C.A., Prohaska, T.R., Davis, C., & Weiner, B. (2007). Pilot test of an attribution retaining intervention to raise walking levels in sedentary older adults. *Journal American Geriatric Society*, 55(11), 1842-1846.

SAS 9.2 (Computer Software). (2009). Cary, NC: SAS Institute Inc.

Schwartz, L., & Ehde, D.M. (2000). Couples and chronic pain. In K.B. Schmaling & T. Goldman Sher (Eds.), *The psychology of couples and illness: Theory, research, and practice* (pp. 191-216). Washington, DC: American Psychological Association.

Sliwinski, M., & Sisto, S. (2006). Gait, quality of life, and their association following total hip arthroplasty. *Journal of Geriatric Physical Therapy*, 29(1), 10-17.

SPSS 16 for Windows (Computer Software). (2010). Chicago, Illinois: SPSS, Inc: An IBM Company.

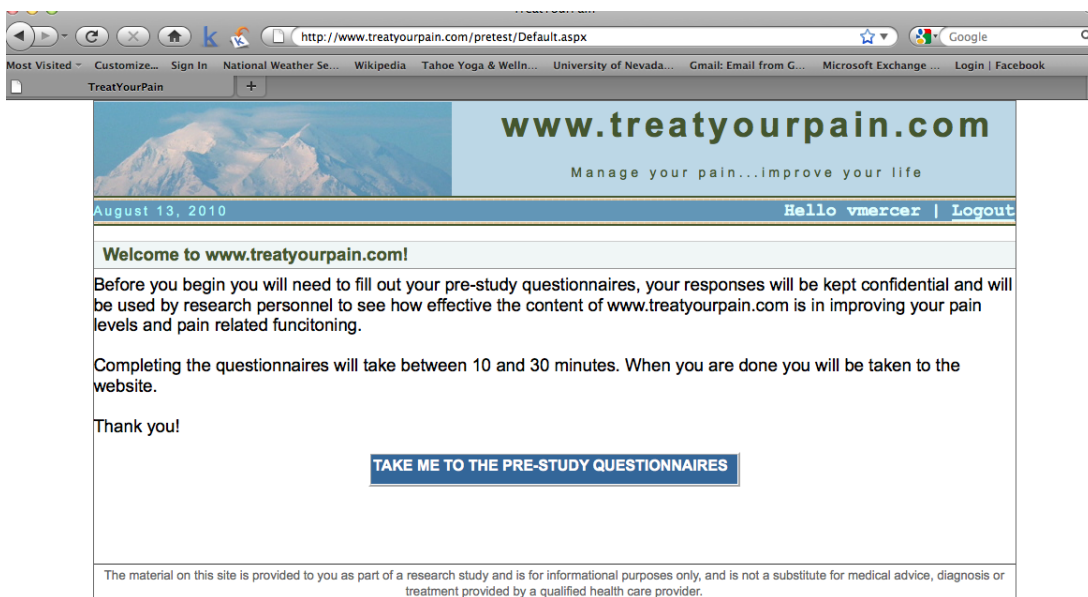
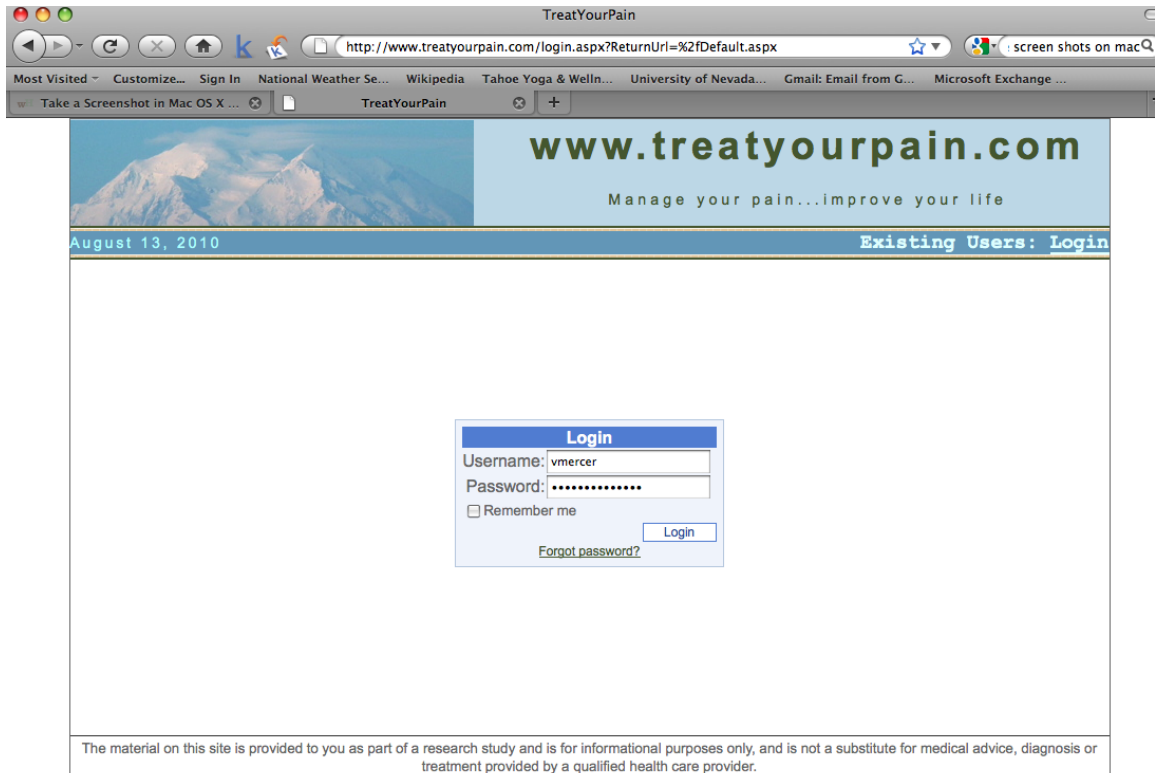
Sorkin, B.A., Rudy, T.E., Hanlon, R.B., Turk, D.C., & Stieg, R.L. (1990). Chronic pain in old and young patients: Differences appear less important than similarities. *Journal of Gerontology*, 45, 64-68.

Stinson, J.N., McGrath, P.J., Hodnett, E.D., Feldman, B.M., Duffy, C.M., Huber, L.B., et al., (2010). An Internet-based self-management program with

- telephone support for adolescents with arthritis: A pilot randomized controlled trial. *Journal of Rheumatology*, Jul 1, Epub ahead of print.
- Stosahl, K. (2001). Identifying and Capitalizing on the Economic Benefits of Primary Behavioral Health Care. In N.A. Cummings, W.T. O'Donohue, & K.E. Ferguson (Eds.), *The Impact of Medical Cost Offset on Practice and Research Making it Work for You*, (p. 57-89). Reno, NV: Context Press.
- Strom, L., Pettersson, R., & Andersson, G. (2000). A controlled trial of self-help treatment of recurrent headache conducted via the internet. *Journal of Consulting and Clinical Psychology*, 68, 722-727.
- Tabachnik, B.G., & Fidell, L.S. (2001). *Using Multivariate Statistics*, 4th Edition, (pp. 11). Boston: Allyn & Bacon.
- Takata, Y., Ansai, T., Soh, I., Awano, S., Yoshitake, Y., Kimura, Y., Sonoki, K., et al. (2010). Quality of life and physical fitness in an 85-year-old population. *Archives of Gerontology & Geriatrics*, 50(3), 272-276.
- Tse, M.Y., Pun, S.Y., & Benzie, I.F.F., (2005). Pain relief strategies used by older people with chronic pain: An exploratory survey for planning patient-centered intervention. *Journal of Clinical Nursing*, 14, 315-320.
- Turk, D.C., & Flor, H. (1987). Pain > pain behavior: Utility and limitations of the pain behavior construct. *Pain*, 31, 277-295.
- Turk, D.C., & Monarch, E.S. (2002). Biopsychosocial perspective on chronic pain. In D.C. Turk & R.J. Gatchel (Eds.), *Psychological Approaches to Pain Management: A Practitioner's Handbook*, 2nd Edition (pp. 3-29). New York: Guilford Press.

- U.S. Department of Health & Human Services (2004). *U.S. health spending by age highlights*. Retrieved May 4, 2008 from <http://www.cms.hhs.gov/NationalHealthExpendData/downloads/2004-highlights.pdf>
- Wan, H., Sengupta, M., Velkoff, V., & DeBarros, K.A., (2005). *65+ in the United States: 2005*. Washington, DC: U.S. Census Bureau current population reports.
- Wanner, M., Martin-Diener, E., Braun-Fahrlander, C., Bauer, G., & Martin, B.W. (2009). Effectiveness of Active-Online, an individually tailored physical activity intervention, in a real-life setting: Randomized controlled trial. *Journal of Medical Internet Research*, 11(3), 1-14.
- Wittink, H., Turk, D., Carr, D., Sukiennik, A., & Rogers, W. (2004). Comparison of the Redundancy, Reliability, and Responsiveness to Change Among SF-36, Oswestry Disability Index, and Multidimensional Pain Inventory. *The Clinical Journal of Pain*, 20(3), 133-142.
- Woodall, W.G., Buller, D.B., Saba, L., Zimmerman, D., Waters, E., Hines, J.M., Cutter, G.R., & Starling, R. (2005). Effect of emailed messages on return use of a nutrition education website and subsequent changes in dietary behavior. *Journal of Medical Internet Research*, 9(3), 49-59.

Appendix A: Example of Secure Data Collection Screens



http://www.treatyourpain.com/pretest/bdq7.aspx

Most Visited - Customize... Sign In National Weather Se... Wikipedia Tahoe Yoga & Welln... University of Nevada... Gmail: Email from G... Microsoft Exchange... Login | Facebook

TreatYourPain +

www.treatyourpain.com
Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

Brief Demographics Questionnaire

1) I was born in:	<input type="text"/> (year)
2) My gender is:	<input type="radio"/> Male <input type="radio"/> Female
3) I live in:	<input type="radio"/> a. USA <input type="radio"/> b. Canada <input type="radio"/> c. Europe <input type="radio"/> d. Asia <input type="radio"/> e. Other
4) I completed the following number of years of education:	<input type="radio"/> a. 1-8 years <input type="radio"/> b. 9-12 years <input type="radio"/> c. Some college <input type="radio"/> d. College degree <input type="radio"/> e. Masters or doctoral degree
5) My annual household income level:	<input type="radio"/> a. Below \$9,800 <input type="radio"/> b. Above \$9,800 <input type="radio"/> c. Above \$20,000 <input type="radio"/> d. Above \$50,000
6) I have experienced chronic pain for:	<input type="radio"/> a. 3-6 months <input type="radio"/> b. 6-9 months <input type="radio"/> c. 9-12 months <input type="radio"/> d. 1-2 years <input type="radio"/> e. 2 or more years <input type="radio"/> Arthritis <input type="radio"/> Back and Neck Issues

http://www.treatyourpain.com/pretest/gpm12.aspx

Most Visited - Customize... Sign In National Weather Se... Wikipedia Tahoe Yoga & Welln... University of Nevada... Gmail: Email from G... Microsoft Exchange... Login | Facebook

TreatYourPain +

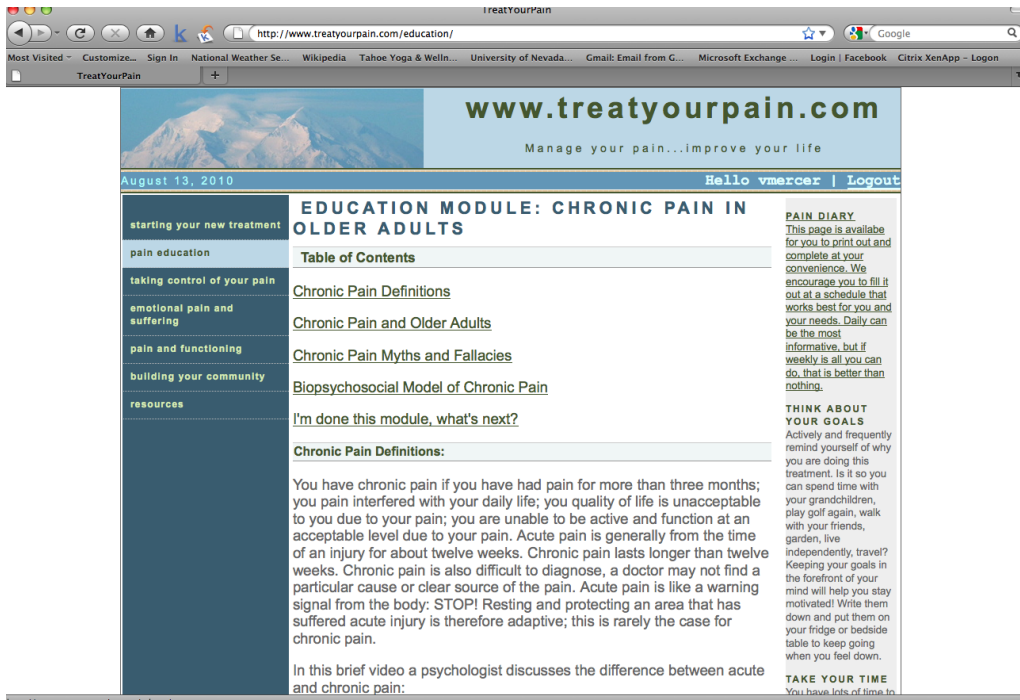
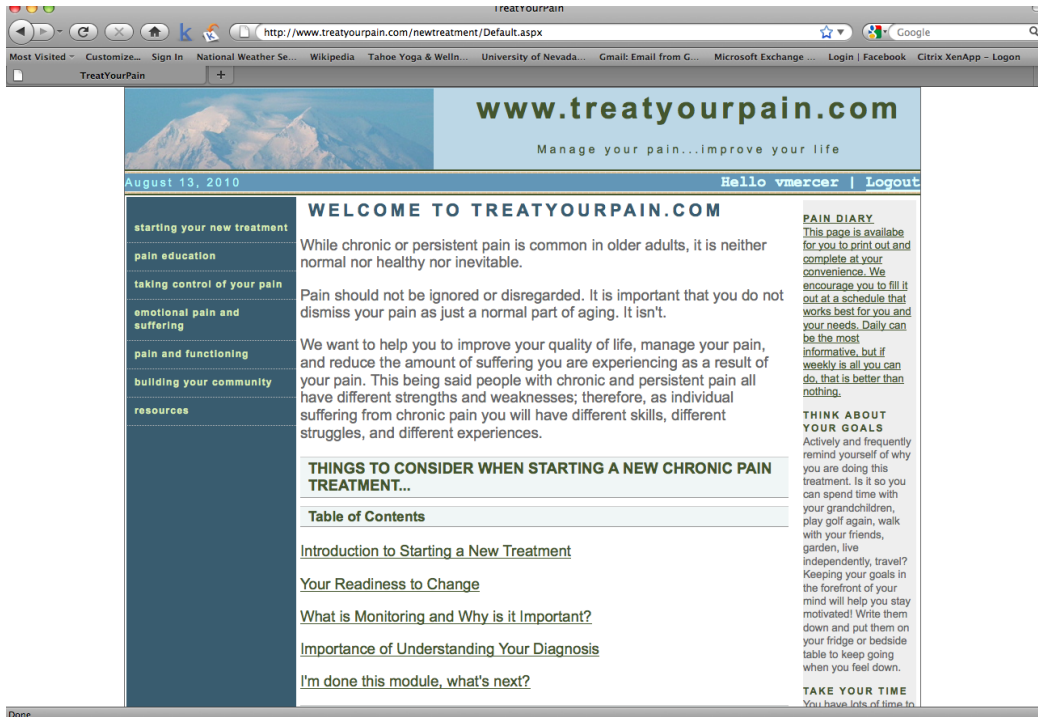
www.treatyourpain.com
Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

Geriatric Pain Measure

1. On a scale of 0-10, with 0 meaning no pain, and 10 meaning the worst pain you can imagine, how severe is your pain today?	<input type="text"/> (Select a number from 0-10)
2. In the last 7 days, on a scale of 0-10, with 0 meaning no pain, and 10 meaning the worst pain you can imagine, how severe has your pain been on average?	<input type="text"/> (Select a number from 0-10)
3. Do you currently have pain with or have you stopped walking less than 200 yards because of your pain?	<input type="radio"/> Yes <input type="radio"/> No
4. Do you currently have pain with or have you stopped walking more than 200 yards because of your pain?	<input type="radio"/> Yes <input type="radio"/> No
5. Do you currently have pain with or have you stopped climbing more than one flight of stairs because of pain?	<input type="radio"/> Yes <input type="radio"/> No
6. Do you currently have pain with or have you stopped moderate activities such as moving a heavy table, pushing a vacuum cleaner, bowling, or playing golf because of pain?	<input type="radio"/> Yes <input type="radio"/> No
7. Does pain prevent you from enjoying any other social or recreational activities (other than religious services)?	<input type="radio"/> Yes <input type="radio"/> No
8. Because of pain, have you cut down the amount of time you spend on work or other activities?	<input type="radio"/> Yes <input type="radio"/> No
9. Because of pain, have you been accomplishing less than you would like to?	<input type="radio"/> Yes <input type="radio"/> No
10. Because of pain, have you limited the kind of	

Appendix B: Examples of Each Treatment Module Screens



TreatYourPain

http://www.treatyourpain.com/emotion/

Most Visited - Customize... Sign In National Weather Se... Wikipedia Tahoe Yoga & Well... University of Nevada... Gmail: Email from G... Microsoft Exchange ...

TreatYourPain

www.treatyourpain.com

Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

starting your new treatment	REDUCING YOUR EMOTIONAL PAIN AND SUFFERING	PAIN DIARY This page is available for you to print out and complete at your convenience. We encourage you to fill it out at a schedule that works best for you and your needs. Daily can be the most informative, but if weekly is all you can do, that is better than nothing.
pain education	Table of Contents	THINK ABOUT YOUR GOALS Actively and frequently remind yourself of why you are doing this treatment. Is it so you can spend time with your grandchildren, play golf again, walk with your friends, garden, live independently, travel? Keeping your goals in the forefront of your mind will help you stay motivated! Write them down and put them on your fridge or bedside table to keep going when you feel down.
taking control of your pain	Chronic Pain and Emotion	
emotional pain and suffering	Chronic Pain and Depression	
pain and functioning	Chronic Pain and Anxiety	
building your community	Social Support and Chronic Pain	
resources	I'm done this module, what's next?	
	Chronic Pain and Emotion:	
	Chronic pain and emotion or moods go together. If you suffer from chronic pain you are more likely to also struggle with depression and anxiety. Pain drains you; it leaves you angry, sad, and sometimes hopeless. These negative emotions then make you less able to cope well with your pain and this starts a vicious cycle. Psychologists have a number of evidence-based strategies that can help you to reduce your depression, anxiety, and anger.	
	Some unsettled emotions can be helpful; they can make you pay attention to the threat of tissue damage and can help promote healing and recovery by helping you avoid things that make your pain worse.	

TreatYourPain

http://www.treatyourpain.com/emotion/

Most Visited - Customize... Sign In National Weather Se... Wikipedia Tahoe Yoga & Well... University of Nevada... Gmail: Email from G... Microsoft Exchange ...

TreatYourPain

www.treatyourpain.com

Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

starting your new treatment	REDUCING YOUR EMOTIONAL PAIN AND SUFFERING	PAIN DIARY This page is available for you to print out and complete at your convenience. We encourage you to fill it out at a schedule that works best for you and your needs. Daily can be the most informative, but if weekly is all you can do, that is better than nothing.
pain education	Table of Contents	THINK ABOUT YOUR GOALS Actively and frequently remind yourself of why you are doing this treatment. Is it so you can spend time with your grandchildren, play golf again, walk with your friends, garden, live independently, travel? Keeping your goals in the forefront of your mind will help you stay motivated! Write them down and put them on your fridge or bedside table to keep going when you feel down.
taking control of your pain	Chronic Pain and Emotion	
emotional pain and suffering	Chronic Pain and Depression	
pain and functioning	Chronic Pain and Anxiety	
building your community	Social Support and Chronic Pain	
resources	I'm done this module, what's next?	
	Chronic Pain and Emotion:	
	Chronic pain and emotion or moods go together. If you suffer from chronic pain you are more likely to also struggle with depression and anxiety. Pain drains you; it leaves you angry, sad, and sometimes hopeless. These negative emotions then make you less able to cope well with your pain and this starts a vicious cycle. Psychologists have a number of evidence-based strategies that can help you to reduce your depression, anxiety, and anger.	
	Some unsettled emotions can be helpful; they can make you pay attention to the threat of tissue damage and can help promote healing and recovery by helping you avoid things that make your pain worse.	

www.treatyourpain.com
Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

YOUR PAIN AND FUNCTIONING

- starting your new treatment
- pain education
- taking control of your pain
- emotional pain and suffering
- pain and functioning
- building your community
- resources

Table of Contents

- [Fatigue and Energy Levels](#)
- [Chronic Pain and Exercise](#)
- [Improving Your Energy](#)
- [Improving Your Sleep and Nutrition](#)
- [I'm done this module, what's next?](#)

Fatigue and Energy Levels

Chronic pain makes you tired, when you are tired you have a lower tolerance for pain, this makes you pain worse, which makes you tired, and so on the cycle goes.

Energy management in the form of regular exercise, activity engagement, good sleep habits and proper nutrition are integral to your successful management of your pain.

In this module we detail information and helpful hints on how to incorporate exercise, and what types of things a complete exercise program should include; how to improve your sleep habits; and, how to make sure you are getting proper nutrition. Please take some time to review the information below and consult your health care practitioners

PAIN DIARY
This page is available for you to print out and complete at your convenience. We encourage you to fill it out at a schedule that works best for you and your needs. Daily can be the most informative, but if weekly is all you can do, that is better than nothing.

THINK ABOUT YOUR GOALS
Actively and frequently remind yourself of why you are doing this treatment. Is it so you can spend time with your grandchildren, play golf again, walk with your friends, garden, live independently, travel? Keeping your goals in the forefront of your mind will help you stay motivated! Write them down and put them on your fridge or bedside table to keep going when you feel down.

www.treatyourpain.com
Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

STRATEGIES TO BUILD YOUR PAIN SUPPORT COMMUNITY AND MAINTAIN YOUR PROGRESS

- starting your new treatment
- pain education
- taking control of your pain
- emotional pain and suffering
- pain and functioning
- building your community
- resources

Table of Contents

- [Working with your Doctors](#)
- [Communicating with Doctors](#)
- [Medications](#)
- [How to Maintain Your Progress](#)
- [I'm done this module, what's next?](#)

Working with your Doctor:

It is important to note that the average medical doctor receives about 10 hours of training in pain management during their training; so, while they may be experts in medical care, they may not be experts in chronic pain.

Beyond that fact, as we mentioned in the beginning of this website the you are the expert in your own pain...which is why it is very important to spend some time thinking about your relationship with your health care providers and whether you feel they are helping your pain management or making it worse.

PAIN DIARY
This page is available for you to print out and complete at your convenience. We encourage you to fill it out at a schedule that works best for you and your needs. Daily can be the most informative, but if weekly is all you can do, that is better than nothing.

THINK ABOUT YOUR GOALS
Actively and frequently remind yourself of why you are doing this treatment. Is it so you can spend time with your grandchildren, play golf again, walk with your friends, garden, live independently, travel? Keeping your goals in the forefront of your mind will help you stay motivated! Write them down and put them on your fridge or bedside table to keep going when you feel down.

TreatYourPain

http://www.treatyourpain.com/resources/

Most Visited - Customize... Sign In National Weather Se... Wikipedia Tahoe Yoga & Welln... University of Nevada... Gmail: Email from G... Microsoft Exchange ...

TreatYourPain

www.treatyourpain.com
Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

starting your new treatment

pain education

taking control of your pain

emotional pain and suffering

pain and functioning

building your community

resources

Within www.treatyourpain.com resources:

Starting New Treatment Module Handouts:

- List of Negatives pdf
- List of Positives pdf
- Goal Setting pdf
- Pain Diary pdf
- Your Diagnosis pdf

Education Module Handouts :

- List of Negatives pdf
- List of Positives pdf
- My Unique Pain Profile pdf

Emotion and Pain Module:

- Find a doctor: www.ama-assn.org
- Find a psychologist: www.locator.apa.org
- Crisis Hotline: USA National Suicide Hotline at 1-800-784-2433 or 1-800-273-8255 or dial 911
- Pleasant Events pdf
- Goal Setting pdf
- Tips for Healthy Living pdf
- Calm Breathing pdf
- Progressive Muscle Relaxation pdf
- Progressive Muscle Relaxation audio file

treatyourpain

http://www.treatyourpain.com/controlgroup/Default.aspx


Most Visited - Customize... Sign In National Weather Se... Wikipedia Tahoe Yoga & Welln... University of Nevada... Gmail: Email from G... Microsoft Exchange ... Login | Facebook

TreatYourPain

www.treatyourpain.com
Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

For the duration of the study you will be asked to review the materials included in this website. Please take your time and use these resources as recommended by the website. You may continue to access these resources by logging in and logging out at www.treatyourpain.com. We hope you find the information useful. At the conclusion of the study you will be asked to fill out post-study questionnaires. Thank you!

 **National Pain Foundation** Font size A A A Home Login Sign Up

Connect. Learn. Live.

Diseases & Conditions Living Tools Community News Providers Donate GO

What's New

Rejuvenate Yourself
Now that New Year's resolutions have come and gone, it's a good time to focus on rejuvenating yourself. Instead of just resolving to exercise or eat right, think about how you can rejuvenate your spirit by taking better care of yourself. Following are some simple ways to rejuvenate your spirit. >> [More](#)

APF Receives Transfer of NPF Assets
The American Pain Foundation is accepting a gracious offer from the National Pain Foundation of a transfer of key assets. This transfer will occur over the next six months with an anticipated completion date of May 2010, at which point the National Pain Foundation will cease all operations. >> [More](#)


Personal Pain Journal
Keeping Track of Your Pain with a Personalized Pain Journal is Easy!


E-mail Login:


Password:

>> [Sign In](#)

Don't have an e-mail login? [Register Now!](#)
[Forgot Password](#)

 Focus on Pain

 Family Issues

 PainSAFE

Appendix C: Examples of Administrative Screens

www.treatyourpain.com
Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

Admin Home
Users

Chronic Patients

TestID	is Pretest?	Date Test Taken	Username	a26a18a2
TestID#26	<input checked="" type="checkbox"/>	4/7/2010 12:1		0 0 2
TestID#27	<input checked="" type="checkbox"/>	4/7/2010 12:2		0 0 2
TestID#30	<input checked="" type="checkbox"/>	4/7/2010 1:25		0 1 2
TestID#32	<input checked="" type="checkbox"/>	4/7/2010 1:57		0 1 3
TestID#34	<input checked="" type="checkbox"/>	4/7/2010 2:22		0 0 2
TestID#35	<input checked="" type="checkbox"/>	4/7/2010 2:30		1 2 2
TestID#36	<input checked="" type="checkbox"/>	4/7/2010 2:51		0 0 1
TestID#37	<input checked="" type="checkbox"/>	4/7/2010 2:58		0 0 2
TestID#39	<input checked="" type="checkbox"/>	4/7/2010 3:14		2 0 0
TestID#40	<input checked="" type="checkbox"/>	4/7/2010 3:22		2 0 1
TestID#43	<input checked="" type="checkbox"/>	4/7/2010 4:22		1 1 1
TestID#47	<input checked="" type="checkbox"/>	4/14/2010 10:		0 0 1
TestID#51	<input checked="" type="checkbox"/>	4/14/2010 10:		0 1 2
TestID#53	<input checked="" type="checkbox"/>	4/14/2010 10:		0 0 1
TestID#58	<input type="checkbox"/>	5/26/2010 11:		0 0 1
TestID#64	<input type="checkbox"/>	5/26/2010 12:		1 0 2
TestID#65	<input type="checkbox"/>	5/26/2010 1:0		0 1 1
TestID#66	<input type="checkbox"/>	5/26/2010 1:1		0 0 1
TestID#70	<input type="checkbox"/>	5/26/2010 3:0		1 0 1

The usernames are being blocked by this screen for privacy.

www.treatyourpain.com
Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

Admin Home
Users

Username	groupType	status	Creation Date
experiment	done	4/14/2010 5:44:13 PM	
control	done	4/14/2010 5:37:42 PM	
control	done	4/14/2010 5:31:04 PM	
control	done	4/14/2010 5:25:35 PM	
control	done	4/14/2010 5:19:22 PM	
experiment	done	4/14/2010 5:12:44 PM	
experiment	done	4/14/2010 5:06:17 PM	
control	done	4/14/2010 4:59:45 PM	
experiment	done	4/8/2010 12:40:10 AM	
experiment	done	4/8/2010 12:32:06 AM	
control	done	4/8/2010 12:13:08 AM	
experiment	done	4/7/2010 11:16:33 PM	
control	done	4/7/2010 11:09:19 PM	
experiment	done	4/7/2010 11:02:48 PM	
control	done	4/7/2010 10:17:50 PM	
experiment	done	4/7/2010 10:10:09 PM	
experiment	done	4/7/2010 10:02:19 PM	
experiment	done	4/7/2010 9:54:25 PM	
control	done	4/7/2010 9:47:06 PM	
control	done	4/7/2010 9:25:19 PM	
control	done	4/7/2010 9:17:03 PM	


The usernames are being blocked by this screen for privacy.

www.treatyourpain.com
Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

Admin Home

Users

username 

[BDQ7 tests of this user](#)

[GHQ12 tests of this user](#)

[GPM12 tests of this user](#)

[CSQ48 tests of this user](#)

[MPI-34 tests of this user](#)

[CSQ-8 tests of this user](#)

Login Date & Time

5/19/2010 11:52:00 AM
5/19/2010 11:17:00 AM
5/12/2010 2:59:00 PM
5/4/2010 11:49:00 AM
4/18/2010 10:22:00 PM
4/12/2010 9:36:00 AM
4/7/2010 12:20:00 PM


www.treatyourpain.com
Manage your pain...improve your life

August 13, 2010 Hello vmercer | Logout

Admin Home

Users

GHQ12 Test

testID	27
isPre	<input checked="" type="checkbox"/>
addedDate	3/25/2010 10:08:00 PM
User	 GHQ12 Tests of this user
a1	
a2	
a3	1
a4	2
a5	3
a6	3
a7	1
a8	1
a9	2
a10	2
a11	2
a12	1

The material on this site is provided to you as part of a research study and is for informational purposes only, and is not a substitute for medical advice, diagnosis or treatment provided by a qualified health care provider.

Appendix D: Email Contact

Welcome to TreatYourPain.com Inbox | X

☆ **treatyourpain** to me show details 12/10/09 ↩ Reply ▼

Thank you for your registration with www.treatyourpain.com. We are pleased to have you participating in our research study. Please keep this email safe in case you forget your user name or password. You may return to treatyourpain.com at anytime by going to www.treatyourpain.com and clicking the "login" button on the upper right corner of the screen.

Your username: trial1
Password: trial1

Treatyourpain.com
www.treatyourpain.com

↩ Reply → Forward

☆ **info@treatyourpain.com** to me show details 12/29/09 ↩ Reply ▼

Don't forget to login to www.treatyourpain.com this week!

↩ Reply → Forward

☆ **info@treatyourpain.com** to me show details 12/29/09 ↩ Reply ▼

Individuals experiencing chronic pain also frequently experience depression. If you are suffering from possible depression or have thoughts of harming yourself get help from a doctor or psychologist. Do not delay, call for help immediately. If you would like to find a doctor in your area look online at www.ama-assn.org. If you would like to find a psychologist in your area call 1-800-964-2000 or look online at www.locator.apa.org. If you have no one to call and need help immediately call the USA National Suicide Hotline at 1-800-784-2433 or 1-800-273-8255 or dial 911.

↩ Reply → Forward

Appendix E: Examples of PDF Handouts

PAIN BEHAVIORS WORKSHEET



The following questions are for you to ask your significant other:

- 1) How do you know when I am in pain?

- 2) What are things that I do to send you the message I am in pain, besides telling you?

- 3) How do you react when I am in pain? (what do you say or do?)

Now that you have that important information, ask yourself the following questions:



- 1) Were you surprised by what you learned?

Date _____

1. Situation	3. Unhelpful thoughts or Beliefs	4. Challenge to Negative Thoughts or Beliefs	5. Rational Response
Describe: a. Actual event leading to unpleasant emotion(s) or b. Thoughts or recollections leading to unpleasant emotion(s)	a. Write automatic thought(s) that preceded emotion(s)/belief(s) b. Rate belief in automatic thought(s) (0-100)	Ask yourself questions to challenge each negative thought/belief. List evidence for and against the thought.	a. Write rational response to thought(s) or belief(s) b. Rate belief in rational response (0-100)
		Evidence for:	
2. Emotions a. Circle emotions that you felt b. Rate intensity of each emotion		Evidence against:	
Intensity (0-100) Fear/anxiety _____ Sadness _____ Anger _____ Guilt _____ Shame _____			



REALISTIC THINKING



Negative thinking from time to time can bog us all down, such as calling ourselves mean names (e.g., "failure", "loser"), thinking no one likes us, expecting something terrible will happen, or believing that we can't overcome something no matter how hard we try. This is normal. No one thinks positively all of the time, particularly when feeling pain.

When we are in pain, or we are feeling anxious, we tend to see the world as a threatening and dangerous place. This reaction makes sense, because imagining the worst can help you to prepare for real danger, enabling you to protect yourself. For example, if you are home alone and you hear a strange scratching sound at the window you might think it is a burglar. If you believe it is a burglar you will become very anxious and prepare yourself to either run out of the house, fight off an attack, or run to the phone and call for help. Although this anxious response is helpful if there is actually a burglar at the window, it is not so helpful if your thought was wrong. For example, it might be a tree branch scratching the window and therefore your thoughts would be wrong because you were not in any real danger.

The problem with thinking and acting as if there is danger when there is no real danger is that you feel unnecessarily anxious. Therefore, one effective strategy to manage your anxiety is to replace anxious, negative thinking with realistic thinking.

What is realistic thinking?

Realistic thinking means looking at all aspects of a situation (the positive, the negative, and the neutral) before making conclusions. In other words, realistic thinking means looking at yourself, others, and the world in a balanced and fair way.



HOW TO DO IT:

Step 1: Pay attention to your self-talk.

Thoughts are the things that we say to ourselves without speaking out loud (self-talk). We can have many thoughts every hour of the day. We all have our own way of thinking about things, and how we think has a big effect on how we feel. When we think that something bad will happen -- such as being bitten by a dog -- we feel anxious.

Often we are unaware of our thoughts, but because they have such a big impact on how we feel, it is important to start paying attention to what we are saying to ourselves.

Step 2: Identify thoughts that lead to feelings of anxiety.

It can take some time and practice to identify the specific thoughts that make you anxious, so here are some helpful tips:

PLEASANT EVENTS, POTENTIALLY ENJOYABLE ACTIVITIES HANDOUT



SEARCH YOUR MIND FOR FUN THINGS YOU LIKE TO DO.....

Research has shown that people who feel sad or depressed can improve their mood and feel better simply by increasing the number of pleasant activities they participate in. Often if you are feeling sad or down what used to bring you happiness or pleasure doesn't seem to anymore; while this may be true, getting into the habit of doing things you used to enjoy may have a payoff on your quality of life.

Another thing that research shows is that many people under predict the amount of pleasure something will give them. While you may not believe this, we ask that you test it out with the activity below.

STEP 1: Select a variety of activities that you used to enjoy but no longer find pleasurable and list them below. These things can take just a brief amount of time (e.g., playing music, calling a friend on the phone), or they can be more time-intensive (e.g., getting your hair cut, going to a movie, playing cards).



STEP 2: Continue to build on the list of potentially pleasurable activities by looking over the list below. Mark the items that could potentially give you a sense of pleasure or happiness:

- Spending time with your family.
- Taking grandchildren to places or participating with them in activities they enjoy (e.g., a trip to the circus, the park, or a museum or science center).
- Going to the movies.
- Getting a massage.
- Visiting a spa.
- Taking a walk.
- Swimming or enjoying a soak in a hot tub.
- Stretching.
- Sitting in the yard.
- Enjoying the sunset.



HOW TO MAINTAIN YOUR PROGRESS



This section is for people who have already done the work needed to improve their chronic pain self-management. Congratulations!

Many people are afraid of losing the progress that they have made, and having what is called a "relapse" or a return to old less effective habits. What usually happens is that once your pain is reduced or your quality of life has improved and you are feeling better, you want to make sure that you hold on to these positive changes in the long-term. This desire is understandable, because some people do slip into those old habits, and they can lose the improvements that they have made. Luckily, there are ways to prevent relapse and maintain your progress.



WHAT IS THE DIFFERENCE BETWEEN A LAPSE AND A RELAPSE?

A lapse is a brief return to old and unhelpful habits. It is a common and normal phenomenon. Sometimes lapses are triggered by stress and low mood, or simply fatigue.

A relapse is a complete return to all of your old ways of thinking and behaving when you are experiencing pain. People who have a relapse are usually doing the same things that they did before they learned some new strategies for managing their pain.

HELPFUL HINT: Although lapses can lead to relapses, they don't have to. You can stop a small lapse from becoming a relapse.



WHEN DOES A LAPSE TURN INTO A RELAPSE?

Often, it is what you say to yourself after you have a lapse that can either help you get back on track or lead you into relapse. If you see your lapse as a sign of failure, you are



CALM BREATHING



What is calm breathing?

You may have heard of different types of breathing exercises, calm breathing is also called "diaphragmatic breathing" and it is a simple technique that is used to slow down your breathing when you are feeling anxious or stressed. There are some good role models for stress management who breathe this way, yoga practitioners and newborn babies!

Why is calm breathing important?

- Our breathing changes when we are feeling anxious or stressed, or in pain. We tend to take short, quick, shallow breaths; this can lead to "overbreathing" or hyperventilation.
- It is really useful to learn how to manage "overbreathing" because that type of breathing can actually increase our anxiety. What happens in the process of overbreathing is that because of the imbalance of oxygen and carbon dioxide in our lungs we start to feel dizzy, our heart races, or we might experience headaches.
- Calm breathing is portable, private, and free. However, to use it well takes some initial practice.



Key Point: Calm breathing is not intended to take your pain away, but rather take the edge of it and help reduce any additional feelings of stress or anxiety.

HOW TO DO IT:

Calm breathing involves taking in smooth, slow, and regular breaths. Sitting upright is usually better than lying down or slouching, because it can increase the capacity of your lungs to fill with air. It is best to "take the weight" off your shoulders by supporting your arms on the side-arms of a chair, or on your lap.

1. Take a slow breath in through your nose, breathing into your lower belly (for about 4 seconds).
2. Hold your breath for 1 or 2 seconds.
3. Exhale slowly through the mouth (for about 4 seconds).
4. Wait a few seconds before taking another breath.

About 6-8 breathing cycles (inhale, exhale, pause) per minute is often helpful to decrease anxiety or tension, but it is important to find the right breathing rhythm for you if this feels wrong. These cycles regulate the amount of oxygen you take in



DOCTOR'S VISIT GUIDE



Before the appointment:

- Make a list of subjects you want to discuss with your doctor at your next appointment.
- From this list, choose the two or three things that are most important to you.
- Collect all your medications in a bag and bring them to the appointment.
- Consider bringing a family member or good friend.
- Review your most recent pain diary and consider showing it, or a diary from a week with higher pain and identified triggers, to your doctor.

At the appointment:

- Discuss with your doctor which questions the two of you can cover during the current visit.
- Share as many details as possible regarding your concerns.
- If you don't understand what your doctor is saying ask him or her to repeat the information in a way you understand.
- Ask whether your doctor would like to see a copy of your pain diary.
- Ask questions and take notes.
- Repeat back what you think your doctor said to make sure you understand.

After the appointment:

- Review your notes.
- Be certain you understand your treatment. Ask more questions about any recommended tests, medications, or additional treatment options.
- Keep your doctor informed of any changes in your condition.
- Make an appointment to discuss any concerns that your doctor did not have time to cover during your appointment.



FREQUENTLY ASKED QUESTIONS:



About your condition:

- What has happened to me?
- Why did it happen?
- Did I do something to cause it?
- How long will I have this condition?

About your treatment options:

- What do I need to do now?
- What choices do I have in treating the condition?
- What are the good things about each choice?
- Will they hurt? How much?