

Online Acceptance-Based Treatment for Fibromyalgia Syndrome:
Development and Evaluation of a New Treatment Program

By

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Abstract

Fibromyalgia Syndrome (FMS) is a disease of unknown etiology that affects up to 3 million Canadians, or 2-10% of the general population (Carruthers & van de Sande, 2005). Acceptance-based behavioural therapy (ABBT) is a relatively recent approach to treating human suffering in general and chronic pain in particular (Hayes, Strosahl, & Wilson, 1999; McCracken, 2005). ABBT treatments have been shown to effectively treat pain, pain-related anxiety, depression, and other behavioural measures of disability (McCracken, 2005; McCracken, Vowles, Gregg, & Almada, 2010; Pear & Simister, 2016, p. 160). In-person treatments can place significant burden on patients and the overall health-care system. Outcomes for online programs can be similar to those for in-person treatment while allowing for increased flexibility for both patients and professionals (Ritterband & Tate, 2009; Strecher, 2007). The current study extended a pilot study (Shay, Tkachuk, Simister, Bailly, & Skrabek, 2011), modifying the previous treatment to a 6 unit program that could be delivered online. Sixty-one participants completed the study, being randomly assigned to an online ABBT plus treatment-as-usual (online ABBT + TAU) group or a treatment-as-usual alone (TAU) group. All participants completed a series of self-report measures at baseline, at post-treatment, and at a 3-month follow-up. Linear mixed modelling supported significant differences between the groups in favour of the ABBT + TAU treatment group on the primary outcome measure (Fibromyalgia Impact Questionnaire-Revised (FIQ-R); $F(2, 52.82) = 20.10, p < .0001$) following treatment. The online ABBT + TAU group also had significantly greater improvements in depression, pain, acceptance, perceived helplessness, and kinesiophobia. Increased acceptance mediated the effects of treatment on improvements in FMS quality of life and FMS impact, while reduced helplessness mediated the effects of treatment on improvements in level of reported pain. Comments and subjective ratings of improvement were

consistent with the quantitative results. Participants rated mindfulness (contact with present moment experience) as the most useful treatment unit.

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Table of Contents

Abstract	II
Acknowledgements	IV
Introduction	2
Acceptance-based therapies	8
Acceptance-Based Therapies for Chronic Pain	10
The Use of Technology in Treatments	13
Benefits of Computer-delivered Treatments	18
Concerns and Disadvantages of Computer-delivered Treatment	20
WebCAPSI as a Treatment Modality	25
Peer review within the WebCAPSI Program	26
Pilot study	27
The Present Study	29
Hypotheses	30
Method	30
Participants	30
Design	34
Procedure	35
Measures	36
Self-report Battery Measures. (See Appendix E)	37
Physical Measures	42
Study Groups	44
Intervention	45
Data Collection	48
Data Analytic Procedures	49
Primary Outcome Analyses	50
Social Validity of Treatment	52
Results	52
Preliminary Analyses	52
Primary Outcome Analyses	54
Secondary Outcome Analyses	55
Primary Process Analysis	55
Secondary Process Analyses	55
Physical Measures	56
Mediation Analyses	56
Treatment Integrity	57
Participant Global Ratings of Change	58
Social Validity of Treatment	59
Discussion	59
Limitations	68
Future Directions	71

Social Implications	75
References.....	77

List of Tables:

Table 1: Demographic Variables.....	105
Table 2: Summary of Self-report Measures.....	106
Table 3: Means and standard variations for study variables.....	107
Table 4: Effect of Group, Time, and the Group*Time Interaction on Outcome and Process Variables	109
Table 5: Mediation effects of changes in overall acceptance (CPAQ total).....	112
Table 6: Mediation effects of changes in pain willingness.....	113
Table 7: Mediation effects of reduced helplessness (PCS-Helplessness)	114
Table 8: Mediation effects of changes in overall kinesiophobia (TSK11-Total)	115
Table 9: Mediation effects of changes in activity avoidance (TSK11-Activity Avoidance)	116
Table 10: Comment themes	117

List of Figures:

Figure 1: Participant Flow	118
Figure 2: Participants' ratings of their confidence in their ability to use identified ABBT strategies....	119
Figure 3: Participants' rankings of the usefulness of each of the ABBT strategies	120
Figure 4: Participants' global ratings of their ability to live with FMS symptoms following treatment	121
Figure 5: Participants' global ratings of their ability to live with pain post treatment	122
Figure 6: Participants' global ratings of their ability to live with fatigue post treatment	123
Figure 7: Participants' global ratings of their ability to live with cognitive symptoms post treatment .	124
Figure 8: Participants' global ratings of their changes in daily functioning post treatment	125

List of Appendices:

Appendix A: Phone screening Questionnaire	126
Appendix B : Consent Form	129
Appendix C: Demographic Questionnaire	135
Appendix D: Post-treatment Questionnaire	136
Appendix E: Self-report Measures.....	139
Appendix F: Unit Materials	159
Unit 1: Introduction & Acceptance.....	160
Unit 2: Values	172
Unit 3: Information on Medications, Sleep, "Fibro Fog", Exercise, and Effective Communication.....	180
Unit 4: Cognitive Defusion (or Thinking is not all that!)	192
Unit 5: Mindfulness & Self-as-Context	199
Unit 6: Are You Willing?	206

Online Acceptance-Based Treatment for Fibromyalgia Syndrome: Development and Evaluation of a New Treatment Program

Fibromyalgia syndrome (FMS) is a chronic disorder involving a complex set of symptoms including widespread pain, marked tenderness, and additional clinical symptoms that can include fatigue, disordered sleep, stiffness, and neurological, neurocognitive, and autonomic/neuroendocrine manifestations (Carruthers & van de Sande, 2005). Research definitions of FMS describe a static condition, which can downplay the critical dynamic features of this syndrome and are typically based on working case definitions established by the American College of Rheumatology in the 1990s and updated in 2010.

FMS is a disorder of unknown etiology that affects 2-10% of the general population, or from 600,000 – 3 million Canadians (Carruthers & van de Sande, 2005). It affects all age groups, all ethnic groups, and all socioeconomic strata. FMS can be difficult to diagnose and patients are sometimes misdiagnosed with other disorders such as lupus, arthritis, or chronic fatigue syndrome. FMS is differentiated from autoimmune disorders by negative laboratory findings and those diagnosed with FMS show less prominent fatigue than individuals with chronic fatigue syndrome. Fibromyalgia comes from the separate words *fibro*, meaning fibrous tissue, *myo*, referring to muscles, and *algia*, meaning pain. Literally speaking, fibromyalgia means pain in muscles and fibrous tissue. Widespread pain for at least 3 months and tenderness on palpitation at 11 or more of 18 tender point sites were originally required for the diagnosis of FMS; however, pain is often not the only symptom associated with having FMS (American College of Rheumatology 1990 criteria *in* Carruthers & van de Sande, 2005). Neurological symptoms (muscle cramps, weakness, headaches, perceptual disturbances, sensory overload), neurocognitive symptoms (attention and memory difficulties, poor executive functioning),

autonomic/endocrine problems (cardiac arrhythmias, neurally mediated hypotension, vertigo, sicca syndrome, and temperature instability), gastrointestinal disturbances, stiffness, fatigue, and sleep difficulties are common. Taking these additional symptoms into account, Wolfe, et al. (2010) proposed a new case definition for FMS. This new definition is based on scores on a widespread pain index and a symptom severity index. The widespread pain index is rated on a scale of 0-19 based on the number of painful body regions whereas the symptom severity index comprises categorical scales ranking the severity of fatigue, waking unrefreshed, cognitive symptoms, and general number of symptoms experienced by the patient at a similar level for at least 3 months. The most significant change to the diagnostic criteria was the removal of the tender point criteria. Wolfe et al. (2010) propose that patients who have a widespread pain index of or greater than 7 and symptom severity index of or greater to 5 or widespread pain of 3-6 and symptom severity of or greater than 9 would meet criteria for FMS.

In addition to the symptoms most often associated with FMS, many patients also develop reactive depression and pain-related anxiety. These clusters of symptoms have an additive effect on patients' poor quality of life and often present in a remitting/relapsing form, requiring patients to learn flexibility in their daily lives and how to incorporate multiple treatments from a variety of health care specialists. This can be especially frustrating to patients as most have led active, normal lives prior to the onset of FMS.

While specific causes of FMS are not yet established, initial symptoms are hypothesized to be brought on by a variety of etiologies including physical trauma (injury or surgery), repetitive strain, childbirth, infections, and chemical exposure. Complicating the investigation into causes, some cases of FMS appear to occur spontaneously, without any obvious etiology. FMS is more prevalent in women, with a 3:1 ratio of diagnosis. This diagnostic variability is

thought to be accounted for by differences in physiology as women tend to have more flexible skeletons, less muscle mass, different hormones, and different autonomic reactions to pain than men that may make women more vulnerable to diseases of the musculoskeletal system. Evidence suggests that individuals with FMS show an abnormal reaction to pain, with increased physiological reactions to painful stimuli such as a thumbnail press as compared with controls (Graceley et al., 2002).

There has been emphasis by the general public and funders of health care on easing patient burden, increasing cost-efficiency, and the development of empirically supported treatment in health care (Chartier-Otis, Perreault, & Bélanger, 2010; Sareen, Cox, Afifi, Clara, & Yu, 2005). While some barriers can be difficult to overcome, other obstacles such as lack of access to care and a preference for self-reliance may be more amenable to change. Using a multi-disciplinary approach and combining information from multiple disciplines into one treatment reduces the frequency of visits to a clinic required because usually only a single clinician is needed to administer treatment. Further, putting the materials online may allow for greater access to treatment when wait lists and set office hours limit the number of patients able to access in-person treatment, especially for those whose disease course is variable and unpredictable. FMS patients often have increased doctor visits, unnecessary medical evaluations, increased absenteeism, and increased risk for psychiatric illness as compared to non-pain matched individuals (Bailey, Carleton, Vlaeyen, & Asmundson, 2010), with estimated medical costs being more than double that of matched controls (Thompson et al., 2010).

Traditional treatment focuses on medication or other treatments (e.g. physiotherapy, massage, hot/cold treatments) to reduce pain and increase mobility. Patients are often left to self-manage symptoms that wax and wane, often fighting significant sleep disturbances and reduced

occupational functioning. As noted above, direct medical costs incurred by a patient with FMS can be double that of other similar individuals (Thompson et al, 2010), although this will vary according to the severity of the condition. The amount of life restriction noted by patients has been found to be predicted by body mass index (BMI), age, depression, and current treatment (Przekop, Haviland, Morton, Oda, & Fraser, 2010).

Medication is often the front-line and most common treatment for FMS, with the primary focus on symptom reduction such as reduced pain or improved sleep. Analgesic medications such as pregabalin, gabapentin, acetaminophen, ibuprofen, and naproxen are commonly prescribed or self-administered by patients; however, many patients report only moderate to mild reduction in the clinical significance of their pain resulting in little, if any, improvement in quality of life. Using medication alone, Arnold (2006) reported that approximately 40% of patients reported clinically significant reduction in their pain. More recently, the use of antidepressant and anti-anxiety medications have also been incorporated into treatment, with varying success (Heymann, Helfenstein & Feldman, 2001; Hauser, Bernardy, Uceyler, & Sommer, 2009; William et al., 2010). While tricyclic antidepressants have shown stronger treatment effects in short term trials, these treatments effects are not maintained long term (Hauser, et al., 2009).

Current evidence indicates that multicomponent treatment approaches involving patient education, physical/exercise therapy (stretching, strengthening, cardiovascular), cognitive-behavioural therapy (relaxation, pacing, sleep hygiene, cognitive stress reduction), and medication therapy, are more effective than single treatments alone (Perrot, Dickenson, & Bennett, 2009; Sarzi-Puttini, et al., 2008, Lemstra & Olszynski, 2005; Keel, Bodoky, Gerhard, &

Muller, 1998). While specific psychological treatments for FMS are limited, treatments for chronic pain have been developed and studied.

Many of the treatments include some component to help patients address the anxiety associated with chronic pain and their perception of pain. Compared to patients who experience primarily acute pain, individuals with chronic pain are more likely to assign meaning to their pain or judge their pain to be negative (Bailey, Carleton, Vlaeyen, & Asmundson, 2010). This assigned meaning to their pain then leads to the individual avoiding situations or stimuli that they perceive may trigger pain, which in turn, increases their fear of the predicted pain experience. Assigning meaning to experiences can result in avoidance of a greater number of situations than simple avoidance conditioning as the patient may generalize their conditioned response to more complex stimuli (e.g. far broader situations). This fear-anxiety-avoidance cycle is well documented in anxiety disorders (Hayes, Beevers, Feldman, Laurenceau, & Perlman, 2005) and is also proposed to be a stronger contributing factor in the maintenance of decreased quality of life than the actual level of pain (Asmundson, Norton, & Norton, 1999; Bailey, Carleton, Vlaeyen, & Asmundson, 2010; McCracken, Zayfert, & Gross, 1992; Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995; Waddell, Newton, Henderson, Sommerville, & Main, 1993). FMS patients reported more severe pain-related restrictions as compared to controls (Przekop et al., 2010), suggesting that this fear-avoidance cycle likely plays a significant role in the decreased quality of life reported by many FMS patients as they restrict their lives further and further in an often unsuccessful effort to avoid the pain associated with the syndrome.

Psychological treatments designed to treat depression and anxiety have been extended and modified as treatments to help patients who suffer with chronic pain. Mowrer's two-factor theory (Mowrer, 1947 as cited in Feather, 1963) explains that some stimuli can be initially

conditioned via classical conditioning, and then responses that remove those stimuli can be maintained by operant conditioning. In the case of pain, a patient may develop a conditioned pain response to a stimulus, and then a response that removes that stimulus may be negatively reinforced. Exposure therapy is one possible treatment to address these conditioned responses (Pear & Simister, 2016, pp. 150-153, 160). Graded exposure to painful stimuli has been used to help patients learn to cope with their pain, but has been criticised as potentially increasing patients' pain anxiety as they focus their attention on their pain perception (Bailey, Carleton, Vlaeyen, & Asmundson, 2010). CBT has also been used successfully in a number of studies to help patients cope with their chronic pain (for examples, see: Anderson & Winkler, 2006, 2007; Ang, Chakr, Mazzuca, France, Steiner, & Stump, 2010; Garcia, Simon, Duran, Cancellor, & Aneiros, 2006; Lera, Gelman, Lopez, Abenoza, Zorrilla, Castro-Fornieles, Salamero, 2009; Mason, Goolkasian, & McCain, 1998; Redando, et.al. 2004; Woods & Asmundson, 2008).

While CBT has shown considerable success in treating chronic pain, there is no strong evidence as to which components of CBT contribute to reduction in symptoms (Vowles, Wetherell, & Sorrell, 2009). Further, according to accumulated evidence from basic research on stimulus equivalence (Hayes, Gifford, & Wilson, 1996), a relatively recent account of human language and cognition called Relational Frame Theory (Hayes, Barnes-Holmes, & Roche, 2001), and a recent review (Longmore & Worrell, 2007), it may not only be unnecessary to challenge negative thinking related to human suffering, but it may also be somewhat contradictory and even detrimental to do so. Acceptance-based therapies such as mindfulness-based stress reduction (MBSR), acceptance and commitment therapy (ACT), and dialectical behavioural therapy (DBT) focus on directing the patient's attention on to living their lives while

opening themselves up to the experiences they struggle with as opposed to attempting to control their internal experiences (Pear & Simister, 2016, p154).

Acceptance-based therapies

Acceptance-based therapies are a relatively recent approach to treating human emotional suffering in general (Hayes, Strosahl, & Wilson, 1999; Pear & Simister, 2016, p. 154; Roemer & Orsillo, 2009) and chronic pain in particular (McCracken, 2005; Pear & Simister, 2016, p. 160). Once such therapy is Acceptance-Based Behavioural Therapy (ABBT; Roemer & Orsillo, 2009). This approach presumes that human suffering largely results from the way that patients relate to their internal experiences and that people will try to avoid distressing thoughts, feelings, memories, and sensations. ABBT contains three main elements. First, problems experienced by patients are seen to be stemming from the way they relate to their internal experiences whereby patients are often seen as “fused” with these experiences. This fusion is characterized by over-identification with thoughts, feelings, or sensations, often leading patients to define themselves and their actions based on their *perception* of their own experiences instead of taking the experience as it is.

The second component is called *experiential avoidance*. Avoidance conditioning occurs when individuals learn that by performing certain behaviours they can avoid or reduce subsequent instances of anxiety or other noxious stimuli. Patients will often restrict their activities in order to avoid pain or fatigue, believing that reducing the frequency and severity of their symptoms will improve the quality of their life. Patients’ efforts to improve their lives often paradoxically lead to further distress or anxiety and diminished quality of life as patients become increasingly restricted to their “safe” choices. This experiential avoidance is often tied to the way in which the patient over-identifies with their own internal experiences. Hayes, Beevers,

Feldman, Laurenceau, and Perlman (2005) noted that exposure to emotional content did not need to occur *in vivo*, but could effectively occur through writing about a situation that elicits negative emotions.

The third component is behavioural restriction, which occurs because the patient who has over-identified with their internal experiences and attempted to avoid them often finds it difficult to engage in activities or actions that are meaningful to them (e.g. consistent with their life goals or values). Taking into consideration patients' fusion with their internal experiences and propensity towards experiential avoidance, ABBT treatments aim to alter a patient's relationship with their internal experiences, increase flexibility and choice by reducing experiential avoidance, and increase a patient's action in a valued direction. While a part of ABBT often includes educating the patient about their condition, the main focus is on both acceptance and change. Metaphors are used to help the patient discover and relate to their avoided emotional experiences. Guided exercises also allow them to experience and accept their internal struggles without avoiding them.

Hayes, Strosahl and Wilson (1999) identified six interrelated core components of Acceptance and Commitment Therapy (ACT) that have influenced the development of ABBT (Pear & Simister, 2016, p. 154; Roemer & Orsillo, 2009). *Acceptance* involves having the individual learn to openly contact their experiences so as to decrease psychological problems and restricted functioning. Acceptance in this model is the opposite of experiential avoidance, and must be distinguished from resignation; a term often used synonymously with acceptance. Acceptance describes a process of actively embracing the totality of one's experience, while resignation refers to the act of giving up. *Mindfulness*, or contact with present moment experiencing, involves non-judgmental contact with one's present experience on a moment-by-

moment basis. *Values* are qualities of action that are in accord with what a person holds as important and serve to guide life directions. Values are distinguished from goals, which tend to involve explicit expectations and are outcome-oriented. *Cognitive defusion* involves teaching an individual to alter the way thoughts, feelings, and sensations are experienced by separating them from each other and from actions. *Self-as-context* involves developing a specific type of self-awareness. The individual learns to distinguish between an experience and the person having the experience. Self-as-context is sometimes referred to as transcendence. Finally, *Committed action* is the active form of acceptance; a person actively chooses the direction his or her actions will take on an on-going basis. Committed action ties all of the other core components together and is usually presented at or near the end of treatment.

Acceptance-Based Therapies for Chronic Pain

Many interventions for chronic pain, such as medication or traditional CBT, focus on strategies to reduce the physical sensation of pain. In contrast, acceptance-based therapies shift the focus away from pain and onto values-based living to develop in the patient what has been termed *psychological flexibility* (Vowles & McCracken, 2010; McCracken, Vowles, & Gauntlett-Gilbert, 2007). This shift serves to increase engagement in valued living without asking patients to control their internal experiences. Psychological flexibility is the additive and interactive result of acceptance, contact with the present moment (mindfulness), values-based actions, an observer self, cognitive defusion, and committed action. ABBT's have been shown to reduce pain-related suffering (i.e., anxiety and depression), improve functioning (e.g., distance walked, sit-to-stand performance), and to reduce pain itself (though the latter is not specifically targeted), (McCracken & Velleman, 2010; McCracken, Vowles, & Eccleston, 2005; McCracken, Vowles, Gregg, & Almada, 2010; McCracken & Zhao-O'Brien, 2010; Vowles & McCracken,

2010; Vowles, McCracken & Eccleston, 2008; Zautra, et al., 2008) with medium to large effect sizes (Johnston, Foster, Shennan, Starkey, & Johnson, 2010; Vowles, McCracken & Eccleston, 2008; Wicksell, Ahlquist, Bring, Melin, & Olsson, 2008). ABBT's also appeared to be more effective in treating chronic pain and whiplash as compared with applied relaxation (Thorsell, Finnes, Dahl, Lundgren, Gybrant, & Buhrman, 2011). Further, McCracken and Zhao-O'Brien (2010) noted that greater acceptance of pain was associated with higher quality of life and predicted general patient functioning. Other studies (Dahl, Wilson, & Nilsson, 2004; Vowles & McCracken, 2008) noted that patients engaged in ACT had fewer sick days and medical treatments as compared with those receiving treatment-as-usual (TAU) alone. Wetherell et al. (2011) also reported greater improvements and satisfaction with treatment when using ACT treatment for chronic pain as compared with CBT. A meta-analysis conducted by Bailey, Carleton, Vlaeyen, and Asmundson (2010) found that graded exposure to painful stimuli such as a thumbnail press or cold water submersion, or activity and acceptance-based treatments for chronic pain were more effective than CBT, being on a waitlist, or TAU. ABBT treatment appears to improve quality of life, depression, and pain-related anxiety even in more severely disabled individuals (McCracken, MacKichan, & Eccleston, 2007); and there is evidence that contextual acceptance of the pain condition is a key element in this treatment success (McCracken, Vowles, & Gauntlett-Gilbert, 2007).

Mindfulness Based Stress Reduction (MBSR) has also been found to be an effective treatment for chronic pain (Kabat-Zinn, 1982; Kabat-Zinn, Lipworth & Burney, 1985). MBSR includes components designed to help the patient develop self-awareness of the effect of physiological arousal on pain by teaching patients to be more focused on the present moment without judging their current thoughts, feelings or sensations. MBSR treatments have been

shown to be effective in improving daily functioning (Kaplan, Goldenberg, & Galvin-Nadeau, 1993; Morone, Greco, & Weiner, 2008; Ljotsson, Andreewitch, Hedman, Ruck, Andersson, & Lindfors, 2010), reducing pain (Smith, Shelley, Dalen, Wiggings, Tooley, & Bernard, 2008), and reducing illness-related depression and grief (Segula & Rice, 2004; Stepton, Salmon, Weissbecker, Ulmer, Floyd, Hoover, & Studts, 2007).

While acceptance-based interventions for chronic pain have been shown to be effective in multiple randomized controlled trials, less is known about how acceptance-based therapy may impact patients with FMS, in particular. Three recent studies (Ljotsson, et al., 2014; Luciano et al, 2014; Wicksell, Kemani, Jensen, Kosek, Kadetoff, Sorjonen, Ingvar, & Olsson, 2013) did support the use of ACT for people with FMS, with psychological flexibility mediating the effects of treatment in the Wicksell et al (2013) study. A recent pilot study was conducted at the University of Manitoba investigating the use of ABBT for FMS with a small sample of 12 patients (Shay, Tkachuk, Simister, Bailly, & Skrabek, 2011). This treatment extended traditional ACT treatments by presenting a number of psychoeducational components (e.g. exercise, communication skills) using an acceptance-based approach in addition to the six core components of ACT. Results of the pilot study supported the use of ABBT for FMS with statistically significant improvements in self-reported pain intensity, sleep, pain-related fear of movement, and pain acceptance. Improvements in FMS symptoms and quality of life, depressive symptoms, and physical performance were also noted, but did not reach statistical significance, possibly related to the small sample size. Patient post-treatment global impressions indicated that the majority of patients reported an improved ability to live with FMS, pain, fatigue, and cognitive symptoms. While preliminary, the results of this study are promising and need to be replicated with a larger sample.

The Use of Technology in Treatments

Prior to the use of the Internet, the use of computers to treat various disorders was widely documented. Computers were being incorporated into treatment as early as the 1960s and have proven effective in assessment and treatment of numerous disorders, either as an adjunct to treatment, as a platform for a virtual support group, or as a stand-alone treatment (Andersson, 2009; Pear & Simister, 2016, p. 156; Tate & Zabinski, 2004). Online treatments have been increasingly common since the late 1990s, with treatment outcomes of online programs performing better than wait list controls and in some cases, reporting treatment effects similar to that of in-person treatment (Barak, Klein, & Proudfoot, 2009; Ritterband & Tate, 2009; Strecher, 2007; Vincent & Leweycky, 2009; William, Kuper, Segar, Mohan, Shelth, & Clauw, 2010).

Online treatments have been used successfully to treat a variety of general mental health and psychiatric conditions. Thus far, “etherapy” programs have been developed and tested as treatment modalities for stress-related problems (Fridrici & Lohaus, 2009; Grime, 2004), anxiety and depression (Andersson et al., 2006; Carlbring, et al, 2006a 2006b; Carlbring, Nordgren, Furmark, & Andresson, 2009; Gega, Marks, & Mataix-Cols, 2004; Krign, Emmelkamp, Olafsson, & Biemond, 2004; Proudfoot et al. 2003, 2004; Richards et al., 2009; White, Jones, & McGarry, 2000; Wiederhold & Wiederhold, 2005), generalized anxiety disorder/social anxiety (Berger, Hohl, & Capar, 2009; Przeworki & Newman, 2004), insomnia (Vicent & Lewycky, 2009), post-traumatic stress disorder (PTSD, Klein et al, 2009; Lange et al., 2003), eating disorders (Goldfield & Boachie, 2003; Tate & Zabinski 2004), substance abuse (Ash, 2010; Bickel, Marsch, Buchhalter, & Badger, 2008; Stevenson & Roblyer, 2006) and pathological grief (Wagner, Knaevelsrud, & Maercker, 2005). They have also been used in psychiatric in-patient treatment (Kinnaman, Strong, Farrell, & Bisconer, 2006), to improve general well-being (Mitchell, Vella-Brodrick, & Klein, 2010), preventative/stepped-care (Bauer, Moessner, Wolf,

Haug, & Kordy, 2009; Efstathiou, 2009), therapist training (Worrall & Fruzzetti, 2009) and for assessment (Butcher, Perry, & Hahn, 2004). Aside from more traditional mental health disorders, e-therapy has also been used successfully to treat psychological aspects of medical conditions such as such as migraines (Berman, Iris, Bode & Drengenberg, 2009; Eccleston, Fisher, Craig, Duffan, Rosser, & Keogh, 2014), irritable bowel syndrome (Hunt, Moshier, & Milonova, 2009) and arthritis (Lorig, Ritter, Laurent, & Plant, 2008). A brief, Internet-enhanced treatment for FMS was shown to be as effective as a more traditional 10-session in-person treatment (William, Kuper, Segar, Mohan, Shelth, & Clauw, 2010); however, this Internet-enhanced treatment still relied on patients attending at least 4 sessions with a therapist, and thus may be less accessible than a completely Web-based system.

Many forms of Internet-supported interventions currently exist; however, the types of interventions vary widely from educational and self-help sites to chat rooms, and from podcasts to expert systems and human-supported online interventions (Barak, Klein, & Proudfoot, 2009). With such a variety of options, it is not surprising that the efficacy of online treatment as a whole is questioned because the efficacy of any particular site is highly variable. Barak et al. (2009) suggest 4 categories of online treatment: Web-based interventions, online counselling or therapy, Internet-operated therapeutic software, and other online activities such as online supplements to face-to-face therapies.

Much as in-person behavioural treatments have evolved in waves, so has the application of technology (Cavanagh & Shapiro, 2004). Initial use of technology consisted of programs that aimed to simulate therapist-client dialogue such as the ELIZA program; however, this program was not initially designed to treat patients but rather to study language processes. These types of programs are rarely used for treatment today, primarily because older technology did not allow

for the types of interactions permitted by current technology and clients were not satisfied by the simulated interaction previously available (Cavanagh & Shapiro, 2004). The application of technology as a treatment modality then evolved to deliver specific behavioural treatments, such as exposure-based-therapy. For example, a computer may be used to generate images of a spider for someone with arachnophobia or an audience for someone with social anxiety. Virtual reality treatment was often used in conjunction with other treatments and was usually therapist guided. This application of technology has been shown to be effective in treating numerous anxiety disorders, including panic disorder, agoraphobia, OCD, social anxiety, and specific phobia (Klign, Emmelkamp, Olafsson, & Biemond, 2004; Wiederhold & Wiederhold, 2005). Finally, technology has been used for educating patients using programmed instruction about their disorders and the treatment of the disorder (psycho-educational components), combining this psychoeducation with cognitive components of treatments (e.g., reducing catastrophizing). These programs are still currently in use; however, studies on them that incorporate rigorous methodology with strong controls are lacking and there is insufficient evidence to draw definite conclusions regarding the effectiveness of such programs to bring about behaviour change (Cavannah & Shapiro, 2004).

More recently, the focus has shifted to using computers to deliver treatment in a fashion similar to the way clients would experience it in traditional therapeutic settings but using the latest technologies (e.g., internet) to do so. Within this wave, one can distinguish online therapies on the basis of how much direct contact via face-to-face meetings, phone consultations, or individual messages a client has with the therapist or others (Newman, Erikson, Przeworski, & Dzus, 2003). In traditional treatment paradigms, clients meet in small groups or one-on-one with a therapist, usually for about 6 to 8 sessions. The first few sessions consist of educating the

clients about their disorder, what anxiety is, how it can become problematic, typical problems experienced by those with anxiety, treatment options, and the rationale for treatment. The remaining sessions focus on providing the clients with skills to improve their coping and reduce their anxiety. Common topics include relaxation training, limiting cognitive distortions, awareness of dysfunctional automatic thinking, and methods to change these dysfunctional thoughts. Computer-based treatments within the 4th wave of application of technology can follow the same structure, but may allow greater flexibility than traditional treatment as computer-based treatments do not necessitate clients and therapists are at the same location at the same time.

Relevant to the fourth wave of technology-assisted treatments, Newman et al. (2003) listed four variations of technology-assisted treatment based on the amount of contact a client has with a therapist. Technology-assisted therapy can be (a) completely self-administered, meaning that there is little to no contact with a therapist, (b) predominately self-administered, where a therapist periodically checks in with the client, but mostly just provides the initial rationale for treatment, (c) minimal contact, in which the therapist is actively involved in directing the interventions, but does not meet with the client in person on a regular basis, and (d) predominantly therapy, which is the traditional treatment modality in which a therapist meets with the client in person at regular intervals, but may also assign certain materials or technology-assisted program for homework .

Given the variations in fourth wave technology-assisted treatments, they could be conceptualized as similar to traditional treatment in that units of material are developed following a pattern similar to what a behaviour therapist would provide in a session, but with reduced or no contact with the therapist. That is, the information and guidance usually provided to the client in a session is provided via technology. Hirai and Clum (2006) found that while the

effect size of self-help treatment alone was lower than therapist-directed treatment, treatment effects with self-help materials alone were significantly better than no-treatment controls and attrition rates for self-help treatments were similar to that of therapist-directed treatment. Thus, self-help materials may be an option for clients who cannot access care, or as a precursor to treatment (Walker, Vincent, & Furer, in Antony & Stein, 2009), and are potentially an important modality that can contribute to a reduction of the disease burden of chronic illnesses (Glasgow, 2009; Kazdin & Blase, 2001). Unfortunately, most self-help literature is not developed by licensed practitioners, and so the benefits of such literature are not well established and may be difficult to track.

A number of more recently published research studies suggest that the effectiveness of this type of treatment is comparable to that of therapist-directed treatments (Knaevelsrud & Maercker, 2007; Richards & Alvarenga, 2002; Spence, Holms, March, & Lipp, 2006; Spek, Cuijpers, Nyklicek, Smits, Riper, Keyzer, & Pop, 2008). Andrews, Cuijpers, Craske, McEnvoy, and Titov (2010) ran a meta-analysis of current etherapy for common affective disorders and reported an overall effect size of 0.88 - well within a range of strong effects and similar to the effect size of face-to-face treatment for these disorders. Research continues to build in etherapy effectiveness as compared with wait-list controls and more traditional face-to-face treatment but more blended research designs are still needed to address both the effectiveness and efficacy of online treatment programs (Danaher & Seely, 2009).

Recently, a self-directed and self-paced online program for chronic pain management was developed and tested (Ruehlman, Karoly, & Enders, 2012). Results from this test suggested that participants who completed the online self-management program experienced significant decreases in pain severity, pain-related interference and emotional burden, perceived disability,

pain catastrophizing, and pain-induced fear. This results was consistent with a study by Eccleston, Fisher, Craig, Duffan, Rosser, & Keogh (2014) which reviewed a number of online treatment studies for chronic pain (particularly for those with migraines) and reported consistent reduction of pain and disability, with effectiveness of the online treatments being similar to similar treatments delivered in-person. Open online interventions have also shown similar benefits in improved health (Munoz, Bunge, Chen, Sculler, Bravin, Shaughnessy, & Perez-Stable, 2015). Online treatments have more recently been used specifically to improve various symptoms associated with FMS. Menga, Ing, Khan, Dupre, Dornelles, Alarakhia, Davis, Zakem, Webb-Detiege, Scopelitis, and Quinet (2014) found that Fibromyalgia Impact Questionnaire scores decreased following an online intervention for FMS. Online mindfulness and acceptance-based treatments have very recently been used with people living with FMS, with increases in social functioning, quality of life, and psychological flexibility, and decreased depression, anxiety, disability, and fatigue (Davis & Zautra, 2013; Ljotsson, Atterlof, Lagerlof, Andersson, Jernelov, Hedman, Kemani, & Wicksell, 2014).

Benefits of Computer-delivered Treatments

Strecher (2007) lists anonymity and accessibility as two of the major benefits of online treatment, especially for populations where pain, scheduling conflicts, or stigma limit their access to care. Although the efficacy, cost-effectiveness, and client readiness of computer-delivered programs have been questioned (Proudfoot et al., 2004), computer-based treatment addresses many of the concerns in health care today (Richards et al., 2009, Ritterband & Tate, 2009; Strecher, 2007). While incidence of most disorders is increasing steadily, accessing care by trained health care providers and obtaining funding for treatment continues to be difficult

(Canadian Psychological Association, 2009; Beesdo, Bittner, Pine, Stein, Hofler, Lieb, & Wittchen, 2007; Cartwright-Hatton, McNichol, & Doubleday, 2006).

Etherapy has been shown to be both a cost effective and a clinically effective method of treatment that stands to address the growing need for access to therapy (Cavanaugh & Shapiro, 2004; McCrone et al., 2004; Tate, Finkelstein, Khavjou, & Gustafson, 2009; Tate & Zabinski, 2004; van der Berg, Shapiro, Bickerstaffe, & Cavanaugh, 2004). A growing number of studies have demonstrated that time demands placed on therapist can be reduced up to 50% by using technology (Andersson et al., 2006; Proudfoot et al., 2004) making etherapy a therapeutic sustainable resource. The flexibility in time dependency also helps to address the shortage of trained therapists, since computer programs allow one therapist can take on more clients then would be otherwise possible (Mitchell, Vella-Brodrick, & Klein, 2010; Tate & Zabinski, 2004) as well as allow patients the flexibility to complete their treatment whenever their symptoms allow (Shepard, Goldstein, Olver, & Parle, 2008).

Empirically supported online treatment will also help address the growing need for reliable information by a public who has come to expect to use technology to access information. Despite previous difficulties incorporating technology into treatment such as with the ELIZA program, looking at the current overwhelming popularity of social networking sites (e.g. Facebook, Twitter), it could be argued that a majority of the public would be pleased to use technology as a method of health-care delivery. While Internet use is generally wide-spread, the acceptability of the internet for treatment is more variable. Not surprisingly, previous experience with computers and regular internet usage has been associated with stronger acceptance of etherapy (Alemi, Haack, Nemes, Aughburns, Sinkule, & Neuhauser, 2009; Fridrici & Lahous, 2009; McTigue et al, 2011; Pratt, 2011; Skinner & Latchford, 2006). The loss of non-verbal cues

associated with technology supported interactions can be a concern, but as more and more people become accustomed to working in an online environment, alternative means of capturing those non-verbal cues develop (Alleman, 2002). For example, videoconferencing still allows for many non-verbal cues to be as salient as in-person meetings, and the developing global language of “text-speak” has established other written and language cues such as the use of CAPS, colour, fonts, repeated letters, and smiley faces to replace missing non-verbal cues.

Current health-related websites may offer static information; however, eotherapy has the potential to be interactive and tailored to the particular patient’s needs (Mitchell et al., 2010). The ability to access eotherapy from the comfort of home has also been raised as a significant advantage as it may facilitate requests for professionally-guided treatment in patients who would not otherwise seek care due to the stigma often attached to help-seeking or due to living in isolated locations (Beattie, Shaw, Kaur, & Kessler, 2009; Jagdeo et al., 2009; Menna & Ruck, 2004; Shepard et al., 2008). Barlett & Coulson (2011) also suggested the use of eotherapy to foster empowerment in patients and reported 82% of patients stated they spoke with their primary physician regarding materials in their eotherapy program and 60% reported that their eotherapy experience affected their relationship with other health professionals. This effect was also noted by McMillan, Avery, & Macias (2009) in older adults.

Concerns and Disadvantages of Computer-delivered Treatment

While computer-delivered treatment has many advantages, it is not without criticisms (Abbott, Klein, & Ciechomski, 2008, Strecher, 2007). Anderson, Jacobs, and Rothbaum (2004) list several potential concerns in using technology to deliver psychological treatment; however, these concerns have either not been supported in previous research or have been addressed using a combination of online and brief in-person contact (Danaher & Seely, 2009; Glasgow, 2009).

Ethical use of technology-based information for medical or psychiatric treatment is a concern (Holmes, 2009; Fisher & Fried, 2003); especially in light of the high level of abuse and the exclusive use of the Internet as a source of information and treatment by the general public. Many self-help groups exist on the Internet, as do many diagnostic tools that enable people to access information that they may not have adequate training to interpret. However, the use of technology can help address concerns of the quality and accuracy of information, and who can gain access to the information provided. The use of passwords and registration helps address safety concerns regarding the accuracy of information and treatment choices mentioned by Ernst and Schmidt (2004) and Anderson et al. (2004). Regular monitoring by mediators of posted material can also help reduce the probability of inaccurate information and guide positive interactions among participants (Abbott, Klein, & Ciechomski, 2008).

Suitability for online treatment is of particular importance when dealing with potential crisis situations such as suicidality (Stofle, 2002), abuse, and psychosis (Abbott, Klein, & Ciechomski, 2008). Marks, Mataix-Cols, Kenwright, Cameron, Hirsch, & Gega (2003) screened for suitability of clients for computer-based CBT and found that 79% of the clients seeking treatment were suitable as they did not present with high-risk symptoms such as psychosis or suicidality. The reduction of almost 80% of clients needing direct care would not only reduce cost and waiting times, but also make therapists more immediately available for those who need face-to-face contact. While attrition is a significant concern in any type of treatment, research conducted by Hebert, Vincent, Lewycky, and Walsh (2010) reported that perceived control, social support, and intention to complete treatment were all associated with adherence to an online treatment for insomnia. Further, Hebert et al (2010) noted that individuals who self-referred to the treatment program were more likely to complete treatment than those referred by

other sources. With proper screening and referral strategies, there does not seem to be any strong evidence that treatments delivered via technology are more likely than traditional face-to-face treatment to experience pitfalls such as client/therapist relationship issues and high-risk situations such as patient suicidality, especially when patients are properly screened prior to beginning treatment. Thus the potential benefits of using technology to deliver treatment make the technology well worth investigating.

Another criticism is not limited to computer-based treatment but is endemic to the new “computer era” in general, voicing concerns that reliance on technology weakens social cohesion. Many proponents of traditional treatment argue that treatment that is exclusively delivered via computer supports and even encourages social isolation. However, McKenna, Green, and Gleason (2002) reported that socially anxious individuals who partook of online treatment not only did not become more isolated but instead developed more relationships online than in person, and that the reduction in social anxiety was maintained in their everyday lives. That is, the social relationships developed in online environments generalized more readily to clients’ daily lives than social relationships in more traditional group treatment did. The authors suggest that in online environments socially anxious clients had fewer social concerns to attend to as they do not have to consider personal matters such as appearance, mannerisms, and shyness. Without these concerns, the environment can become akin to a more traditional systematic desensitization program for specific phobias – i.e., a program in which clients are exposed in a gradual manner to specific stimuli that elicit intense anxiety. Clients can be encouraged to gradually expose themselves to increasingly anxious situations online such as replying to conversation, initiating conversation, or maintaining a friendship with someone online. This effect may also be true for those who hide a stigmatized condition such as FMS. In

an online environment, participants may be better able to control what information they share (such as amount of disability, gender) until they are comfortable with those they are interacting with online. With positive feedback from their online interactions, patients may become more willing to share with other members of their own social network. Alcaniz, Botella, Banos, Zaragoza, and Guixeres (2009), Alleman (2002), and Camillus (2007) all reported increased disclosure online as compared with face-to-face interactions.

The impact of the use of technology on the therapist-client relationship has also been raised as a concern (Alleman, 2002; Chu, Choudhury, Shortt, Pincus, Creed, & Kendall, 2004). However, there is no evidence to date that the use of technology has a negative impact on therapeutic alliances. That is, the relationship between the therapist and the client that facilitates and improves treatment does not seem to be hurt in any way by the use of technology (Chu, Choudhury, Shortt, Pincus, Creed, & Kendall, 2004; Knaevelsrud & Maercker, 2007). In fact, properly managed, the use of online interactions can actually allow for relationships to develop that otherwise would be limited by access concerns. This increased accessibility to both therapists and other individuals who suffer from the same disorders is one of the main benefits to the use of properly managed technology. Technology-delivered treatments should probably be restricted to non-experiential based treatments, since missing or limited non-verbal cues and technology issues (e.g., “crashing” of sites) make it difficult to produce the environment of more traditional psychotherapy where the therapist relies heavily on the patient experience in session. Stepped care, whereby clients partake in the computer-based treatment as either a precursor to traditional treatment or after discharge from traditional therapy, is also an alternative to help ensure successful application of technology (Tate & Zabinski, 2004).

Anderson et al. (2004) list access and barriers to the use of technology as a concern in the development of technology-based treatments. Currently, the majority of individuals in North America have either personal or public access to the Internet. Sirouatka (2002) noted that the National Institute for Mental Health (NIMH) Website logged as many as 7 million hits every month. In fact, more people are likely to have access to Web-based treatment than to traditional treatment because the Internet reduces barriers such as costs and distance. McCrone et al. (2004) demonstrated the cost-effectiveness of technology-based treatments, including the reduced costs that result from the accessibility of these treatments to marginalized populations.

Part of the concern with computer treatments is the lack of adequately controlled studies (Barak, Klein, & Proudfoot, 2009; Ritterband & Tate, 2009; Strecher, 2007; Tate, Finkelstein, Khavjou, & Gustafson, 2009). Postel, de Haan, and DeJong (2008) see three major weaknesses in many e-therapy research papers. First, treatment compliance is not always stated in the studies; second, treatment specifics/credibility (e.g. operational definitions) is not sufficiently included; and finally, few articles discuss potential co-interventions. Anderson, Jacobs, and Rothbaum (2004) list similar concerns in using technology to deliver psychological treatment, but these concerns have either have not been supported in previous research or can be addressed using a mixed method of research (Danaher & Seely, 2009; Glasgow, 2009). Improving study designs to scientifically compare the effectiveness and economic effects of online treatment compared with in-person treatment would add much needed support to the literature. Ritterband, Thorndike, Cox, Kovatchev, & Gonder-Frederick (2009) have suggested that behavioural models of research and intervention would be most amendable to online research and treatment. Strecher (2007) also points out that the most effective online treatment programs would also be tailored to the unique characteristics of its users. With complex diseases such as FMS, any treatment program would

need to be designed for individuals who require flexibility to access the program at any time so that they can participate regardless of their health status. An effective program should also include brief, simple interventions that incorporate a variety of different modes of instruction in order to address the neurocognitive symptoms that accompany the disorder.

WebCAPSI as a Treatment Modality

With the increased use of technology offering greater access to information than ever before, well-defined and studied programs that can deliver treatment are needed. While some factors (e.g., instillation of hope, imparting of information) can also be created in individual therapy, others (e.g., group cohesiveness, interpersonal learning) are exclusive to group dynamics, and are thus lacking in most computer-based treatments because most computer-based treatments are individually focused. There appears to be no dedicated online program that combines ABBT for FMS with the user option of peer interaction and feedback. This is a significant shortcoming given that there are aspects of therapy that cannot be created in a simple dyadic relationship. Developing a computer-based program that combines both the benefits of individual therapy and the social benefits of group interaction would be a positive step not only toward enhancing current online treatments available for individuals, but also addressing increasing financial and personnel concerns that relate to accessing the limited available treatments.

A computer-based program that addresses all of the above concerns and benefits can be developed by a fairly straightforward modification of a program called Computer-Aided Personalized System of Instruction (CAPSI), which is currently used to teach several courses at several universities including the University of Manitoba. In 2006, CAPSI was upgraded to a Web-based program, which I will refer to as WebCAPSI. In the past year, the WebCAPSI

program has further been expanded outside of the academic environment with a dedicated program called CAPSI-Therapy. CAPSI-Therapy incorporates all the same features as the previous versions of the program, but has exchanged academic labels such as instructor with more typical treatment-based labels such as facilitator. Further, the CAPSI-Therapy program has additional features not available in previous versions such as automated consent forms that are particularly relevant to research outside of the academic environment.

WebCAPSI, and now CAPSI-Therapy, focuses on incorporating mastery learning and peer-review in an online learning environment in which students write unit tests at their own pace and then serve as peer reviewers for units on which they have demonstrated mastery (Pear, 2002, 2003; Pear & Crone-Todd, 1999, 2002; Pear & Kinsner, 1988; Pear & Martin, 2004; Pear & Novak, 1996; Pear, Schnerch, Silva, Svenningsen, & Lambert, 2011). WebCAPSI is an outgrowth of personalized system of instruction (PSI) – a proven effective instructional method (Keller, 1968; Keller & Sherman, 1982). A meta-analysis by Kulik, Kulik, and Bangert-Downs (1990) indicated that PSI facilitates the learning process more effectively than traditional lecture methods; however, Eyre (2007) notes that PSI isn't being used to its full potential. For further details regarding WebCAPSI or CAPSI-Therapy, visit www.capsi.org.

Peer review within the WebCAPSI Program

A potential use of the WebCAPSI or CAPSI-Therapy programs in a modified form would be as a treatment protocol of psychological interventions for any number of disorders. Rochlen, Zack, and Speyer (2004) list the following as major benefits of technology-based treatments: convenience, increased access, disinhibition (e.g., less face-to-face contact allows for freer flow of ideas), internalization of responsibility for continued progress, reflection (e.g., being able to re-consider previous comments/presented materials after feedback), therapeutic effects of

writing, telepresence (e.g. the relationship between online/technology users within a therapeutic environment), decreased transference, and hypertextuality. The design of WebCAPSI should include all of these benefits due to the interaction among peers, increased availability of trained therapists due to reduced time demands, and the elaborative answers given within each study unit by patients. WebCAPSI's use of peer review may thus function to increase exposure to others with similar disorders and help improve communication skills. Further, given that patients using WebCAPSI would likely receive feedback from multiple sources (e.g. the therapist and other patients), and would themselves provide feedback to other patients' responses within WebCAPSI, this repetitive exposure to the materials may serve as sufficient exposure to improve accuracy of perceptions of their own performance relative to others.

WebCAPSI is being used successfully as a teaching tool, and preliminary research has indicated that WebCAPSI can be an effective tool to deliver self-help based treatment for social anxiety (Simister, 2010). While effects of peer-review were not noted in the previously mentioned study, the short nature of the intervention impacted participants' ability to engage in peer-review. The newer, CAPSI-Therapy program would be similarly well-suited as a platform to deliver ABBT treatment to patients with FMS, and a longer treatment period may allow for investigation of any effects of peer-review on treatment outcome.

Pilot study

The pilot study (Shay, Tkachuk, Simister, Bailly, & Skrabek, 2011) previously mentioned was completed in 2011. Participants were recruited through a local FMS support organization. The study incorporated the use of focus groups to identify key components FMS patients were seeking from a treatment, as well as what may be missing from currently available community-based treatments. Based on this feedback, and in reviewing the current research on

the use of ABBT for chronic pain or other chronic conditions, a 10 session treatment program was designed and then tested with a small sample of 12 patients. Nine participants completed the treatment.

The treatment consisted of 4 group sessions and 6 individual sessions that took place over the course of 3 months. Group sessions focused on psychoeducational materials such as understanding FMS, common medications, sleep, exercise, and communication skills. Group sessions ran 90 minutes in length, occurred once per month at a local health centre, and were facilitated by two graduate students under supervision. Individual sessions were designed to reduce participants' attachment to and focus on their internal thoughts, sensations, and emotions, improve their awareness of actual sensations, reduce avoidance, and improve behavioural engagement in their lives. Individual sessions were 60 minutes in length and took place at the same health centre as group sessions. Patients were assigned one of the two student therapists who conducted all individual sessions for that particular patient. Individual sessions were held at two-week intervals so that each participant completed two individual sessions between each group treatment. All participants were also provided a set of CDs that included audio recordings of specific exercises (e.g. body scan meditation), audio-recorded vignettes of fictional FMS sufferers, and handouts provided to participants in each session.

Baseline and post-treatment measures evaluating FMS impact, mindfulness, chronic pain acceptance, sleep, fear of movement, depression, physical performance, values, and pain were administered to all patients, with plans for a follow-up administration of the measures in the coming months. Results of the pilot study supported the use ABBT for FMS with statistically significant improvements in self-reported pain intensity, sleep, pain-related fear of movement, and pain acceptance. Improvements in FMS symptoms and impact on daily life, depressive

symptoms, and physical performance were also noted, but did not reach statistical significance. Patient reports on post-treatment global impressions indicated that nearly all patients had improvements in FMS impact on daily life, pain, fatigue, and cognitive symptoms. The results of this study were promising and suggested that a follow-up study be conducted with a larger sample to replicate these findings.

The Present Study

The present study aimed to expand on the pilot study not only with a larger sample size, but also to examine if the treatment materials could be delivered via an online treatment portal. The pilot study was used to gain feedback on the treatment materials prior to developing the online portion of the current study. The present study used similar measures and ABBT materials as the pilot study but combined the treatment materials into six online units to reduce the burden on participants in the current study. While the results of the pilot study added support to prior research indicating ABBT can be effective for treating chronic pain in general, and FMS specifically, participating in the pilot study required significant time commitments and many (1-2 times per week) appointments for 8 weeks by both participants and treatment facilitators. Determining if the treatment could be provided effectively online would be a natural next step to determine if the benefits of online treatments (e.g., less time-and-space dependant, reduced clinician time demands) combined with the efficacy of the treatment materials could offer a treatment option for those living with FMS. As such, the present study was developed to test if the modified treatment program would be effective in treating those with FMS, and if those completing the study were able to complete the materials provided online with limited assistance. Further, the present study aimed to add to the literature of what components of the treatment may be particularly beneficial in improving symptoms and disability associated with FMS. In order to

examine the efficacy of the treatment, a treatment-as-usual (TAU) control group was added and a randomized control trial design was chosen to offer between-group comparisons rather than the exclusive within-subject design of the pilot study. In the current study, all participants continued their pre-study treatments (TAU); however the experimental group also received the online ABBT treatment.

Hypotheses

Two main hypotheses were tested: (1) Participants who complete an online 6-session ABBT + TAU for FMS will show significant improvements in the primary outcomes (i.e., FMS-related quality of life), secondary outcomes (i.e., pain, sleep, depression) and process variables (i.e., pain acceptance, cognitive fusion, valued living, mindfulness, pain catastrophizing, and pain-related fear) as compared to participants in the TAU alone condition; and (2) One or more process variables (pain acceptance, cognitive fusion, valued living, mindfulness, pain catastrophizing, and pain-related fear) will mediate any observed treatment effects.

Method

Participants

Participants were recruited via referrals by general physicians at local clinics, two advertisements within a local newspaper, advertisements for self-referral posted in the waiting rooms at local clinics, and advertisements through various self-help groups for individuals with FMS. The study was posted on ClinicalTrials.org. While this was not a part of the planned recruitment strategy, the primary researcher received inquiries about participation due to this listing. *Inclusion criteria:* Participants of either sex aged 18 years and older with a formal diagnosis of FMS were recruited. Individuals younger than 18 years of age were to be excluded in order to ensure all participants had reached the age of majority and could provide consent; however no participants under the age of 18 contacted the primary researcher to participate. All

participants had a self-reported pain intensity rating of at least 4/10 based on a 0-10 rating scale (0 representing no pain) administered during an initial phone screening interview. Participants were screened using the Wolfe et al (2010) criteria during the in-person session to ensure they met criteria for FMS. *Exclusion criteria:* People with co-morbidities such as rheumatologic conditions, other conditions affecting the immune system (e.g. chronic fatigue syndrome, multiple sclerosis, lupus), brain injury, cognitive impairment that would limit a participant's ability to complete informed consent, active psychosis, substance abuse, untreated severe major depression or bipolar disorder, active suicidality, or those who had current active injury claims were excluded. Participants were asked if they had completed at least grade 9 in high school. Those who had only completed grade 8 or lower would have been excluded; however no participants reported completing grade 8 or lower and thus no one was excluded due to this criterion. This criterion was included as there was a significant amount of reading and writing required of participants in the study. Written treatment materials had previously been assessed for reading level, with the most difficult unit falling at a reading level of grade 8.9. Further, participants were asked to maintain their pre-study treatment regime and not make changes to their medications or begin other treatments for the duration of the study. Pre-study treatments (TAU) varied per participant but included a broad range of pharmacological and non-pharmacological treatments. Prescribed and over-the-counter analgesics were the most commonly reported treatments; however participants also reported taking other classes of drugs such as mood stabilizers, anti-convulsives, spinal nerve blocks, and supplements. Participants additionally reported using massage, physiotherapy, formal and informal exercise programs, acupuncture, heat/cold therapy, and diets prior to the study. Participants were asked post-treatment and at follow-up if they had changed their treatment(s) after starting the current study

and were asked to list what changes had been made. Participants who regularly use *pro re nata* (PRN) medications were not excluded but were asked about the frequency of their PRN medication use post-treatment. Participants who completed the in-person pilot study and individuals who were current or recent recipients of acceptance-based psychological treatment for pain were not eligible to participate in the online study. These requirements were made clear at the time of recruitment.

Additionally, participants were asked during an intake phone screening if they anticipated having difficulty accessing computers with a high-speed Internet connection on a weekly basis. No participants who expressed interest in the study were excluded by the researchers due to insufficient access to computers; however, two individuals who initially contacted the research team decided not to participate, stating a preference for in-person treatment.

Once referrals were received, potential participants were contacted by phone for an initial screening (Appendix A). This screening included verification of FMS diagnosis (self-reported by patients based on a formal diagnosis by a qualified medical professional), confirmation of regular access to the Internet, and screening for inclusion and exclusion criteria. During the phone interview, potential participants were provided with basic information regarding the study such as what the treatment would involve and the online components of the study. They were asked if they had any concerns with the use of mindfulness or with the study requirement of limiting any changes to their current treatment program for the duration of the study.

Potential participants who were deemed appropriate for inclusion and were still interested in participating were asked to attend a single, in-person session to provide consent (Appendix B) and complete baseline physical testing. Participants were also provided with a copy of the consent form at this meeting and provided an opportunity to ask questions. This initial meeting

also provided an opportunity for a final, in-person screening to verify that the individual met diagnostic criteria for FMS and was suitable for online treatment (e.g., no obvious psychosis, thought disorders, reading difficulties, suicidality). No participants were excluded at this stage. Efforts were made to minimize the impact of attending an in-person meeting such as attempting to schedule the session around other medical appointments at the same location and offering participants a choice of dates and times to best fit their schedule. Participants received a \$25 honorarium once they had completed post-treatment measures and a \$50 honorarium once they completed follow-up measures to compensate them for travel to/from the three in-person sessions and for their time. All participants were also able to access the treatment free of charge.

One hundred and nineteen potential participants provided their initial consent to contact them regarding the study. Four participants who contacted the researcher via ClinicalTrials.org were excluded as they did not live within the designated treatment area (Manitoba), despite this exclusion criteria being listed within the participant section of the ClinicalTrials.org study page. Sixty-seven participants were registered in the study, with 61 participants being used in the final analysis (30 in the treatment group and 31 in the control group. See Figure 1 for a participant flow-chart). While not initially matched for demographic variables or baseline measure results, no significant differences were noted between the groups at baseline. See Table 1 for a breakdown of participant demographics per group. Participants were primarily female, with only 1 male participant in the treatment group and 2 male participants in the control group. Participants ranged from 20 years of age to 81 years of age (\bar{X} =38 years), with the majority of the participants having completed high-school or some post-secondary degree/diploma. There was a wide range of reported previous treatments attempted, with the most common being prescribed

analgesic medication and physiotherapy. Time since diagnosis of FMS ranged from 6 months to 12 years (\bar{X} =3.5 years).

Design

All participants were permitted to continue for the duration of the study whatever other treatments they were receiving prior to the start of the study (treatment-as-usual; TAU). The specific treatment(s) therefore varied per participant, but included prescribed and over-the-counter medications, exercise, manual therapies (e.g., physiotherapy, massage) and hot/cold treatment. Participants were randomly assigned to the online Acceptance-based behaviour therapy (ABBT+TAU) or TAU alone condition using a computerized randomization program. Participants were handed an envelope with their assigned study ID, study information, instructions for completing the remainder of the study, including online self-report questionnaires, and information on how to contact the research team. While participants were not blind to their treatment condition, randomization after the baseline measures helped to limit biases. A registered physiotherapist, who was employed to complete the physical testing with participants, remained blind to participants' assigned condition for the duration of the study.

All participants were provided a unique study ID that served as a user ID to complete the online portions of the study and to anonymously link participant data throughout the study. Participants in the online group also used this ID as their login and initial password to access CAPSI-Therapy. No names appeared on any questionnaires or physical measures data sheets, and participants were only identified by their user ID. This identification was used to link participants' answers on the questionnaires to their CAPSI-Therapy materials and across different administration of the measures. Participant first name and last name initial were collected with participants' verbal consent and listed on a sign-in sheet beside their unique user

ID so that the researcher could retrieve any forgotten user IDs during the study. This sheet was only available to the lead researcher, and was shredded once all of the data collection was complete.

Procedure

After providing informed consent, all participants completed physical testing prior to being randomly assigned to the online ABBT + TAU or to the TAU alone group. They were then provided with an envelope containing their unique user ID and instructions for how to complete an online demographics questionnaire and series of nine self-report questionnaires on Qualtrics, as well as other relevant study information. Participants in the online treatment group also received instructions on accessing and using the CAPSI-Therapy program. Participants in the TAU alone group were informed via a letter within the envelope that they would have an opportunity to access the online treatment after the 3-month follow-up was completed (5 months after the start of the study) and were provided with information on how to do so. Fifteen participants in the TAU alone group ultimately signed on to the treatment program following the end of the study.

At the end of the two-month treatment period, all participants were asked to return to the clinic to complete post-treatment physical measures. This visit also provided an opportunity for participants to ask questions or provide feedback to the researchers. Participants were provided a link to complete the post-treatment, self-report measures via Qualtrics where they were asked to complete the same self-report questionnaires as at baseline, with the participant global evaluation of change replacing the demographic questionnaire.

Three months following the end of the treatment period, participants were again asked to return to the clinic to complete a third and final administration of the physical measures and were

provided an email link to complete the same self-report measures via Qualtrics as post-treatment. Once they had completed the questionnaires, participants were provided with a written debriefing of the study, as well as contact information for the researcher in case the participant had a preference for an in-person or phone debriefing. Information on additional resources for treatment and support groups were included in the debriefing, as well as information on when and how participants would be able access a summary of the final results of the study. Efforts were made to contact the participants via phone or email if they did not complete the final administration of the questionnaires to provide feedback on their participation in the study. Once all follow-up measures were completed, participants in the TAU alone group were offered an opportunity to complete the treatment program with access to the CAPSI-Therapy program for a 2-month period.

Measures

In addition to the consent form (Appendix B), participants were asked to complete a brief demographic questionnaire (age, gender, occupation, year of diagnosis, and current and previous treatments; Appendix C), a post-treatment participant global rating of change scale (Tkachuk, Graff, Martin, & Bernstein, 2003; Appendix D), and a battery of self-report measures to assess pain, disease impact, pain acceptance, mindfulness, cognitive fusion, valued living, pain catastrophizing, pain-related fear avoidance, mood, and sleep (Appendix E). The self-report battery was completed at three points throughout the study: at baseline, post-treatment, and at a three-month follow-up. All self-report measures were completed by participants via Qualtrics regardless of their assigned group. A more detailed description of the measures is included below, with measures separated into outcome (constructs that provide specific results) and process (constructs that help explain why changes are occurring) measures; and by primary and

secondary measures (based on their relationship to study hypotheses). A brief summary of the self-report measures can be found in Table 2. Further, four physical measures were completed by participants during in-person sessions with a licensed physiotherapist at a local clinic at the same three time-points (within one week) as the questionnaires. The physical measures were included as a part of a larger multi-disciplinary research study.

Self-report Battery Measures. (See Appendix E)

Primary outcome measure.

Fibromyalgia Impact Questionnaire-Revised (FIQ-R; Bennett, Friend, Jones, Ward, Han, & Ross, 2009)

The FIQ-R is an instrument designed to quantify the overall impact of fibromyalgia over many dimensions (e.g. function, pain level, fatigue, sleep disturbance, psychological distress, etc.). It yields three psychometrically derived subscales (i.e., function, impact, and symptoms) and a total score. The total score ranges from 0 to 100 with the larger number indicting poorer adjustment. The average score for patients seen in tertiary care settings is about 50 (Henriksson, & Burckhardt, 1996). The FIQ-R and its predecessor, the FIQ, (Burckhardt, Clark, & Bennett, 1991), have been widely used to assess change in fibromyalgia status. The FIQ-R is a recent update to the FIQ but has similar psychometric properties (Bennett, Friend, Jones, Ward, Han, & Ross, 2009). Cronbach's alpha for the total score on the FIQ ranges from .72 to .93 and test-retest scores for a 1-week interval have ranged from .56 to .96. (Burckhardt, Clark, & Bennett, 1991; Henriksson, & Burckhardt, 1996). The FIQ-R can discriminate between untreated fibromyalgia patients, patients who have completed a 6-month multidisciplinary treatment program, and people who do not have any chronic painful illness (Henriksson, & Burckhardt, 1996). The average change in the FIQ total score in the clinical trials referenced above is about

19% (9 points; Anderson & Winkler, 2007, 2006; Henriksson, & Burckhardt, 1996; White, Nielson, Harth, Ostbye, & Speechley, 2002; White, Speechley, Harth, & Ostbye, 1999). The FIQ-R will be used as the primary measure of interest when evaluating this study's hypotheses.

Secondary Outcome Measures.

Centre for Epidemiological Studies Depression Scale (CES-D; Weissman, 1977)

The Centre for Epidemiological Studies Depression Scale (CES-D) is a commonly used 20-item questionnaire designed to measure symptoms of depression. Patients respond to items on a 4-point scale ranging from 0 (rarely or none of the time) to 3 (most or all of the time) with total scores ranging from 0 to 60. The CES-D has shown good reliability ($\alpha = .84$ to $.90$) and validity with high correlations with other measures of depression (Radloff, 1977).

McGill Pain Questionnaire- short form (SF-MPQ; Melzack, 1987)

The McGill Pain Questionnaire-short form (SF-MPQ) consists of 15 items that ask the patients to rank their current pain experience on a 4-point Likert scale, with scores ranging from 0 (no pain) to a maximum score of 45. In addition to a total score, two subscale scores (i.e., Affective and Sensory) are computed. The SF-MPQ has shown good reliability ($\alpha = .78$) (Melzack, & Katz, 2001).

Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1988)

The Pittsburgh Sleep Quality Index (PSQI) is a 19-item questionnaire commonly used to evaluate subjective sleep quality. Patients rate each item on a scale of 0 to 3, with total scores ranging from 0 to 21 and higher scores representing poorer sleep quality. The PSQI has good reliability ($\alpha = 0.83$) and validity, with diagnostic sensitivity of nearly 90% (Buysse, Reynolds, Monk, Berman, & Kupfer, 1988).

*Process Measures.**Primary Process Measure.*Chronic Pain Acceptance Questionnaire-Revised (CPAQ-R; McCracken, 1998)

The Chronic Pain Acceptance Questionnaire-Revised (CPAQ-R) is a 20-item scale designed to assess pain-related acceptance. The scale is comprised of two psychometrically-derived subscales (i.e., extent of engagement in activities, and willingness to experience pain while engaging in life activities). Patients are asked to rate each item on a scale of 0 (never true) to 6 (always true). The CPAQ-R has good reliability ($\alpha = .78$ to $.82$) and moderate to high correlations with measures of avoidance, distress, and daily functioning (Vowles, McCracken, McCloud, & Eccleston, 2008).

Secondary Process Measures.

Secondary Process Measures were included in this study to address prior criticism and recommendations (McCracken & Vowels, 2014) to include measures that capture individual core components of ABBT. There is limited, if any, research validating these measures in a FMS population specifically, or more generally, in people living with chronic pain. Further, what is available based on a review of previous research conducted in ABBTs generally, and chronic pain in particular, does not suggest a consensus on which available measures should be used to measure each component of ABBT. For completeness, two traditional measures of cognitive-behavioural adjustment to chronic pain (ie., pain catastrophizing and kinesiophobia) were also administered. While not routinely targeted as a part of an ABBT, these measures were included because they have been validated for use with chronic pain populations and with FMS in particular. They were also included to provide some comparison to studies within the FMS literature that use a primary CBT treatment model.

Cognitive Fusion Questionnaire (CFQ, Gillanders, et al., 2010)

The Cognitive Fusion Questionnaire (CFQ) is a 13-item scale designed to assess an individual's fusion with or attachment to their thoughts as well as a patient's ability to defuse or separate from those thoughts. Patients rate each item on a scale of 1 (never true) to 7 (always true). The CFQ has a mean score of 44.3 (10.5) and good reliability ($\alpha = .85$) (Gillanders, et. al., 2010).

Valued Living Questionnaire (VLQ, Wilson, Sandoz, Kitchens, & Roberts, 2010)

The Valued Living Questionnaire (VLQ) is a 20-item self-report measure that asks patients to rate first the importance they place on 10 separate life domains (e.g. family, work, recreation) and then how consistently they believe they have been living according to those valued areas in the past 2 weeks. Each individual item is rated on a 10- point Likert scale from 1(not at all) to 10 (extremely important/consistent). A composite score is obtained by multiplying the importance and consistency subscales on each domain, and then obtaining an average by summing all ten domain scores and dividing the total by 10. The VLQ has overall reliability coefficient between .65-.74, with stronger reliability on the importance subscale ($\alpha = .79- .83$) than on the consistency subscale ($\alpha = .58-.60$). The VLQ also has good test-retest reliability ($r = .75$) and strong correlations with other measures of quality of life, suggesting good validity of the measure. (Wilson, Sandoz, Kitchens, & Roberts, 2010).

Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietmeyer, & Toney, 2006)

The Five Facet Mindfulness Questionnaire (FFMQ) is a 39 item questionnaire that was designed based on exploratory factor analysis of 5 commonly used mindfulness measures, which yielded five facets of mindfulness: observe, describe, act with awareness, non-judgement of

inner experience, and non-reaction to inner experience. The FFMQ has strong internal consistency ($\alpha = .75 - .91$), as well as moderate-to-large convergent, discriminant, and content validity (Baer, Smith, Hopkins, Krietmeyer, & Toney, 2006, Baer, et al., 2008, in McCracken, 2010).

Pain Catastrophizing Scale (PCS; Sullivan, Bishop, & Pivik, 1995)

The Pain Catastrophizing Scale (PCS) is a 13-item scale designed to assess aspects of catastrophizing on a patient's pain experience. Individuals are asked to rate the degree to which they experience each of 13 thoughts or feelings related to their pain on a scale of 0 (not at all) to 4 (all the time). Total scores range from 0-52. In addition to a total score, three subscale scores based on factor analysis: Magnification, Rumination, and Helplessness, are also scored. The PCS has been shown to have good internal consistency for each of the total and subscales (Total =0.87, Magnification = 0.66; Rumination = .87, Helplessness =0.78) (Sullivan, Bishop, & Pivik, 1995).

Tampa Scale for Kinesiophobia-11 (TSK11; Woby, Roach, Urmston, & Watson, 2005)

The Tampa Scale for Kinesiophobia-11 (TSK-11) is an 11-item scale designed to assess patients' fear of movement/(re)injury. Patients are asked to respond to items on a 4-point Likert scale from 1 (strongly disagree) to 4 (strongly agree). In addition of a maximum total score of 44, the TSK-11 also provides scores on two psychometrically-derived subscales: activity avoidance and somatic focus. The TSK-11 has been shown to have good test-retest reliability ($r= 0.89$), concurrent validity and predictive validity (Woby, Roach, Urman, & Watson, 2005, Tkachuk & Harris, 2012). Reduction of at least 4 points on the scale post-treatment is suggestive of important reduction in fear of movement (Woby, Roach, Urman, & Watson, 2005).

Participant Global Ratings of Change

Participants were asked to rate to what degree the treatment helped them to live and function with their FMS symptoms using items similar to those previously used with patients suffering from Irritable Bowel Syndrome (Tkachuk, Graff, Martin, & Bernstein, 2003). Item scores ranged from 0 (worse than before) to 4 (completely improved). Several items also asked participants to rate how confident they were using the strategies, how frequently they practiced each component, and what aspects of the program they found most helpful. Global patient evaluations or ratings of change are commonly used in clinical research (see Eisen, Ranganathan, Seal, & Spiro, 2007 & Heymann, Helfenstein, & Feldman, 2001) to assist in quantifying patient change over time following treatment or to mark changes in the presentation of a health condition (Kamper, Maher, & MacKay, 2009), and have been recommended for use in clinical trials with chronic pain populations (Dworkin, Turk, Farrar, et al., 2005; Farrar, Young, LaMoreaux, Werth, & Poole, 2001).

Physical Measures.

6-minute walk test

The 6-minute walk test required patients to walk up and down a 55-meter corridor. The procedure followed a similar procedure described by Guyatt, Sullivan, Thompson, Fallen, Pugsley, Taylor, *et al.*(1985), who demonstrated that the task was reliably able to differentiate between different levels of disability and could also serve as a way for participants to monitor their own progress after the conclusion of the study. The 6-minute walk test has also been shown reliable and a valid measure of change following intervention in patients with FMS (King, Wessel, Bhambhani, Sholter, & Maksymowych, 2000) and is recommended as a measure of change in functioning/physical ability (Segura & Martinez-Olmos, 2011). A corridor at the clinic

was chosen and marks placed on the base of the walls at in this case 5 m. Participants who needed to use walking aids (e.g. canes, walkers) were permitted to do so, but this information was recorded and participants were asked to use the same walking aids at all three testing sessions. All participants were given permission to use the walls for support or to sit down if and when this was needed. Participants were informed of elapsed time on each lap or at each minute if laps were very slow. Total distance in meters and number of breaks taken during the 6 minutes were recorded.

1-minute sit-to-stand test

Getting up from a chair is a commonly performed activity that can often be difficult for individuals with functional impairments and chronic pain. The sit-to-stand test was performed on a standard firm chair with no armrests and participants were instructed not to use their upper extremities to assist. Participants were instructed to stand up fully, and to sit down as many times as they could safely and comfortably for 1 minute. Each sit-to-stand was counted as 1 repetition. The registered physiotherapist recorded the frequency of sit-stand repetitions. This procedure followed the one outlined by Harding, de Williams, Richardson, Nicholas, Jackson, Richardson & Pither (1994). This task has been recommended (see Harding, et. al, 1994; Kotake, Dohi, Kajiwara, Sumi, Koyama, & Miura, 1993; and Segura & Martinez-Olmos, 2011) as a way to differentiate patients' response to various disease progression and treatments received for a given condition.

Thermal Sensation tests.

To determine if the intervention had any effects on pain temperature thresholds, thermal testing was done utilizing a TSA-II NeuroSensory Analyzer (Medoc, Durham, NC). The TSA-II is a precise computer-controlled device capable of generating and documenting responses to

highly repeatable thermal stimuli, such as heat, cold, heat-induced pain, and cold-induced pain. This device is based on Peltier elements consisting of semiconductors which produce a temperature gradient between the upper and lower stimulator surfaces. Testing procedures are reliable (Moloney, Hall, & Doody, 2012; O'Neill & O'Neill, 2015). A 30x30 mm thermode capable of heating or cooling was placed against the skin of the participant's forearm. Previous research has shown that individuals with FMS have small nerve fibre pathology (Uceyler, Zeller, Kahn, Kewening, Kittel-Schneider, Schmid, Cassanov-Molla, Reiners, & Sommer, 2013) which can be differentiated with the TSA-II. Two tasks were included: cold sensation and cold pain. In the case of cold sensation, temperature is recorded when the participant indicates when he/she first feels cool. For the cold induced pain task, the participant indicates when that stimulus is perceived as painful. Testing was completed with participants by a qualified physiotherapist and the procedure was approved for use in the study by the University/hospital ethics board. Participants were able to shut off the machine themselves using a hand-held device. In addition, the machine was programmed to terminate automatically prior to reaching a temperature that could cause tissue damage. A mean of three separate trials was used as the overall result of each of the two cold tasks at each time point to obtain a score for each participant.

Study Groups

Treatment as usual (TAU).

Participants in the TAU alone condition were asked to simply continue their current treatment regime such as guidance under their general practitioner or other medical specialist and were not provided with any of the treatment materials until after the end of the follow-up assessment. Treatments varied per participant, but included prescribed and over-the-counter analgesic medications, nerve-block injections, anti-convulsive medications, mood stabilizers,

supplements, manual therapies (e.g., physiotherapy, massage therapy), acupuncture, hot/cold therapies, formal and informal exercise programs, and diet changes.

Online Acceptance-based behavioural therapy + Treatment as usual (online ABBT + TAU).

Participants continues with their current treatments, as described in the TAU alone condition. Participants in the online study condition were also instructed to complete the online ABBT program and provided with information on how to access the program in addition to their pre-study treatment regime such as guidance under their general practitioner or other medical specialist. Treatment materials used in the current study were developed under the guidance of a registered psychologist and online treatment, while delivered primarily by the researcher, was provided under the guidance of a registered psychologist.

Intervention

The protocol from the pilot study was modified so that it could be placed online using the CAPSI-Therapy program for the current study. Six distinct units were created based on feedback received for the 10 ABBT units used in the pilot study. In each of these units, metaphors, vignettes, and various experiential exercises supported within the ABBT literature were employed to help the participants learn each of the key components of the ABBT. The specific units can be found in Appendix F. All 6 units were web-based and participant learning was enhanced through the use of audio recordings, as well as directed readings and experiential homework exercises. Each online unit consisted of: (a) assigned reading materials designed to help participants understand the concepts presented in the treatment, (b) experiential exercises for the participants to practice, (c) questions developed to help guide participants through the reading and exercises, and (d) unit assignments where participants were asked to answer a

random selection of three of the questions presented within each unit. Questions on the reading materials and experiential exercises were imbedded within the reading materials on each unit. Many of the units also included multimedia presentations embedded within the CAPSI-Therapy program to facilitate learning. For example, within the mindfulness unit, an audio recording was used to guide the patient through a mindfulness meditation exercise.

Unit 1 covered basic psychoeducational materials relevant to FMS, an introduction to ABBT and materials related to acceptance. This unit also introduced 4 vignettes of fictional individuals who live with FMS. These vignettes were used to highlight or demonstrate certain treatment interventions and to add a level of interpersonal relatedness to the intervention. Unit 3 covered additional psychoeducational information on topics such as sleep, exercise, and communication. Units 2, 4, 5, and 6 employed the use of metaphors, experiential exercises, and vignettes to cover topics consistent with ABBT- including values, cognitive defusion, mindfulness, discovering the observer-self, and willingness. These units were reviewed by two participants from the pilot study to ensure readability and that content they felt was helpful during the pilot study was adequately included in the online documents.

Participants in the online treatment group were informed that they had a total of 2 months to complete the online treatment program; however they were encouraged to complete one unit weekly for a total of 6 weeks. The additional time was provided to allow for the variable nature of symptoms associated with FMS, to reduce the pressure to complete readings and exercises, and to allow participants time to practice the skills presented within the treatment. The experimenter provided participants who were completing the treatment phase of the study with weekly email reminders to complete the program along with a reminder to contact the researcher/therapist if they had any questions or concerns. All participants received weekly

emails reminding them to let the study staff know if they altered their current treatment in any way (apart from what was presented in the current ABBT materials).

Participants demonstrated their understanding of the materials in each unit via their written responses to questions relating to the experiential exercises that were assigned as a part of each unit. Participants did not need to be assigned a “pass” on a given unit prior to accessing information in later units; however they did need to demonstrate mastery on one unit prior to being permitted to submit their responses for later units. Materials presented within the CAPSI-Therapy program were not locked and participants in the ABBT+TAU condition could access all treatment materials as soon as they had completed baseline measures. This was initiated as it was also believed (based on experience with other online treatments) that participants would be more likely to attempt all treatment materials if they were not required to submit written assignments and that participants themselves were better able to select which order to complete the reading and exercises associated with the treatment units they felt would be most helpful rather than impose a set order laid out by the researcher. Participant responses to all homework assignments and written responses were submitted via the CAPSI-Therapy program. Initially, the study procedure allowed participants who had previously completed a particular study unit to provide peer-feedback to other participants on that same unit; however, this was discontinued as participants expressed concerns regarding the often lengthy delay in receiving feedback from peer-reviewers. In lieu of peer feedback, while submitting written answers to study questions within the CAPSI-Therapy program, participants could also pose specific questions to the researcher. They were then contacted individually by the researcher via email in order to respond to their questions, or were provided feedback within the CAPSI-Therapy program as a part of the routine review of their submitted answers.

Due to the self-paced nature of the CAPSI-Therapy program and the ongoing recruitment, participants started and finished the treatment at different times within the study period. This flexibility is seen as one of the benefits of the current treatment and study design as it reduced any potential delay of the onset of the treatment portion of the study and allowed for ongoing flexibility in completing treatment for participants experiencing the variability in symptoms often associated with FMS. The combination of self-paced treatment and access to materials without necessarily submitting written assignments resulted in some participants not completing online assignments for all 6 units within the time frame of the study. It was not possible to determine if participants had completed the experiential exercises on their own without submitting written assignments using the current study design. Participants were notified of upcoming deadlines on a regular basis via email to ensure that they had sufficient opportunity to benefit from the entire treatment protocol. Information collected within the CAPSI-Therapy program supported that while not all participants submitted formal assignments, all did access the treatment materials provided.

Data Collection

Stored data were collected online via Qualtrics, from within the CAPSI-Therapy program, and during in-person physical testing sessions. Questionnaire data from Qualtrics was downloaded directly into SPSS 22.0. One participant elected to complete the questionnaires on paper in lieu of online. That participant's data was entered manually within the SPSS 22.0 dataset, as were all physical measures data. The final dataset was verified for accuracy by two independent reviewers to ensure no errors were present from manual entry or due to importing errors. Dummy variables of 0 and 1 were assigned for the online ABBT + TAU and TAU alone groups, respectively. A time variable was also included to denote each of the three time-points

(baseline=1, post-treatment= 2, follow-up= 3). Summary scores for total score and subscale scores for each questionnaire were created. Difference scores were created for each variable to be included in a planned mediation analysis by subtracting the post-treatment score from the baseline score, and by subtracting the follow-up score from the baseline score for each participant.

Two different data files were used in the final analysis. One file included demographic information, physical measures, and all summary scores in their original format. This file was used for testing of assumptions, to examine demographic variables, and to complete mediation analyses. A second data file included the same information but transposed in order to conduct the linear mixed model analyses. Again, both files were verified by independent reviewers to verify accuracy and ensure no errors were present following the transposition process. The PROCESS syntax by Hayes (2012) was downloaded from (<http://www.afhayes.com/spss-sas-and-mplus-macros-and-code.html>) and installed into SPSS 22.0 as per the instructions on Hayes' website. This PROCESS syntax was used to conduct all mediation analyses.

Data Analytic Procedures

Linear mixed modeling (LMM) was employed to assess if the null hypotheses could be rejected. This type of analysis was preferable to the Repeated-Measures ANOVA as LMM is a very robust method of data analysis that is less impacted by violations of assumptions that commonly occur in applied research (Field, 2009, Howell, 2010). LMM does not assume compound symmetry (homogeneity of variance) and thus is more robust when pooling error terms from hierarchical models. Mixed or hierarchical modeling is an appropriate method of analyzing data that includes both fixed and random effects such as in the present between- and within-subject design. Further, LMM is well suited for research studies where missing data are

expected such as in the current clinical trial. While methods exist to correct for missing data, the proposed approach limited human error that could have been associated with the extra step of correcting missing data as LMM is more robust to missing data and does not require the design to be balanced. LMM also did not require the assumption of independence but rather assumes relationships between variables. In other words, LMM allowed the researcher to construct models with correlated random effects without violating the assumptions of the statistical test.

This study employed a restricted maximum likelihood (REML) parameter estimate in place of the least squared approach. The present analyses first employed the use of an unstructured covariance structure to look for any potential effects, followed by an autoregressive covariance structure recommended for repeated-measures design by Field (2009).

All demographic variables and baseline scores were examined to determine if any significant pre-treatment differences existed between the treatment groups. Data were examined for outliers using stem and leaf plots and z-scores for each variable. Residual plots, Box's M test, and Mauchley's test were used to examine assumptions of linear mixed models.

Primary Outcome Analyses

The first hypothesis stated that participants who complete the online 6-session ABBT + TAU for FMS would show significant improvements in the primary outcomes (i.e., FMS-related quality of life), secondary outcomes (i.e., pain, sleep, depression) and process variables (i.e., pain acceptance, cognitive fusion, valued living, mindfulness, pain catastrophizing, and pain-related fear) as compared to participants in the TAU alone condition. The primary outcome was examined using scores on the primary measure of interest, the FIQ-R. LMM was employed to evaluate changes over time for the online ABBT + TAU and the TAU alone groups. An alpha level of 0.05 with a Bonferroni correction (i.e., $p < 0.013$) was used to examine the FIQ-R total,

impact, symptoms, and function scores. A responder analysis was also conducted. Based on previous research, a responder was defined as any participant who had at least a 9 point or greater improvement in the FIQ-R total score between baseline and follow-up (Anderson & Winkler, 2007, 2006). Chi-square analyses were used to determine if the proportion of responders differed between the online ABBT + TAU and TAU alone groups. Effect sizes are reported for each subscale.

Secondary Outcome and Process Variable Analyses

Secondary and process variables were also examined using LMM to address the first hypothesis and look for differences between the groups on each of the secondary outcome (MPQ, CES-D, & PSQI), primary process (CPAQ), and secondary process (CFQ, FFM, VLQ, PCS, & TSK-11) variables. Effect sizes are reported for each analysis.

Mediation Analyses

The second hypothesis stated that one or more process variables (pain acceptance, cognitive fusion, valued living, mindfulness, pain catastrophizing, and pain-related fear) will mediate any observed treatment effects. A technique used to estimate the sampling distribution by taking repeated samples from the dataset (Preacher Hayes bootstrapping) was applied to all process variables and outcome variables which were significant in the LMM. This method accommodates for multiple mediators and covariates and creates a new sample thereby being more powerful than Sobel's test to detect mediation effects. The Preacher Hayes method is more robust to violations of normal distribution (Zhao, Lynch, & Chen, 2010). Consistent with previous research (Wicksell et al., 2013), longitudinal mediation was completed; however, analyses were restricted to variables where a significant time by condition interaction was found in the LMM analyses. The treatment condition was entered as the independent variable, pre-to-

post-treatment changes in the process variable was entered as the mediator, and pre-to-follow-up changes in the outcome variable were entered as the dependant variable. For all analyses, a 5000 bootstrap and a 95% confidence interval was used.

Patient Global Ratings of Change

Chi-square tests examined differences between the online ABBT + TAU and the TAU alone groups on global ratings of change in overall FMS symptoms, pain, fatigue, cognitive symptoms, and overall functioning at post-treatment and follow-up.

Social Validity of Treatment

Feedback from participants was downloaded from Qualtrics and from CAPSI-Therapy into a single Excel file. All identifying information (e.g., physician names, study IDs) were removed. Comments were examined for themes on how to improve the program, any difficulty with completing online content, and how the participants felt each module of the program contributed to their treatment. This information was evaluated by two separate raters who rated each of the comments as positive or negative, and assigned each comment to a general theme (e.g. online delivery/ CAPSI-Therapy, related to ABBT, etc.). Once raters had independently reviewed the comments, they then compared theme coding and discussed content themes prior to repeating independent ratings of the comments. This process was repeated until at least 80% agreement on coded themes was obtained.

Results

Preliminary Analyses

In all, 67 participants were initially enrolled, with 33 assigned to the treatment (ABBT + TAU) group and 34 assigned to the control (TAU alone) group. After attrition, 30 participants in the ABBT+TAU and 31 participants in the TAU alone groups were used in the final analysis

(See Figure 1). Visual examination of the data set revealed 3 cases where a participant did not answer an item on a single questionnaire. In these cases mean replacement using the mean for the group (ABBT + TAU or TAU alone) on that item in order to get a summary score on that questionnaire. Visual analysis also revealed that one participant in the ABBT + TAU group completed the baseline and follow-up measures, but not the post-treatment questionnaires. Similarly, three participants in the ABBT + TAU group and 6 participants in the TAU alone group completed baseline and post-treatment, but not follow-up questionnaires (attrition). Given that LMM was used to address this type of missing data, results from these participants were included in the final analyses. There were no instances of participants in either group completing the majority of questionnaires at a given time point, but having omitted one or more questionnaires at that time point. In other words, participants tended to complete all questionnaires if they completed any at a given time point.

Means, standard deviations, and frequencies for demographic variables are presented in Table 1, and did not indicate any significant differences between the groups prior to treatment. Baseline scores in both groups were also consistent with scores commonly seen in tertiary care settings. Specific pre-study treatments varied per person, but no significant differences in the types (e.g., medications, manual therapies) or frequency of use of each type were noted between the groups. While outliers were noted on nearly all total and subscale scores across each time point, none of the outliers were more than 2.5 standard deviations from the mean and were thus included in the final analysis. Outliers were noted in the online ABBT + TAU and TAU alone groups and the frequency of outliers were similar across groups. Examination of residual plots, Box's M test, and Mauchley's test revealed that none of the assumptions of linear mixed models (LMM) were violated. Bozdogan's Criteria was used to examine goodness of fit, and suggested

the current models were appropriate. Means and standard deviations per group for each total score and subscale score on each measure at baseline, post-treatment, and follow-up can be found in Table 3. Decreasing means over time represent improvements in scores on the constructs measured, with the exception of the CPAQ and FFMS, where increases in score represent improvements.

Primary Outcome Analyses

The results supported the first hypothesis with regards to the primary outcome measure. Significant treatment by time interaction effects from LMM revealed improvements in the online ABBT + TAU participants relative to the TAU participants on the total and three subscale (i.e., impact, symptoms, and function) (all p 's < 0.001) scores of the primary outcome measure (FIQ-R) (See Table 4). Main effects of group and time were also noted (total score, function, and symptoms p <0.001; impact group main effect $p = 0.003$; impact time main effect $p = 0.005$). In the analysis of treatment responders, 21 participants in the online ABBT + TAU group showed a 9 point or greater improvement in total FIQ-R scores between baseline and post-treatment, as compared to 6 participants in the TAU alone group ($\chi^2 = 8.33$, $p = 0.004$). At follow-up, three additional participants from the online ABBT + TAU group met responder criteria, for a total of 24, as compared to 6 in the TAU alone group ($\chi^2 = 10.8$, $p < 0.001$). Note that the responder analysis should not be taken as an indication of the efficacy of treatment as usual (TAU) because even though there was a request to hold this constant, the precise nature of treatment (eg., pharmacological or physical therapy), as prescribed by their practitioner, was free to vary among participants.

Secondary Outcome Analyses

Similar to the results of the primary outcome analysis, the results supported the first hypothesis for improvements on two of the secondary outcome measures (CES-D and McGill) but not for the PSQI. Significant treatment by time interaction effects demonstrated that the online ABBT + TAU participants improved significantly, as compared to TAU participants, on measures of depression (CES-D, $p = 0.022$) and pain (i.e., McGill total ($p = 0.015$), sensory ($p = 0.038$), and affective ($p = 0.025$) subscales). Main effects of time were also noted on all of these measures ($p = 0.004$ for CES-D; $p < 0.001$ for all McGill scales). Although there was a trend toward improvement in sleep for the online treatment group, the treatment by time improvement in sleep (PSQI) ($p = 0.065$) was not significant, despite significant main effects of group and time ($p = 0.024$ and $p = 0.021$, respectively) (See Table 4).

Primary Process Analysis

Results also supported the effectiveness of the treatment for increasing acceptance. Significant improvements were noted for the participants who received online ABBT + TAU, relative to the TAU alone group, on the primary process measure of acceptance (CPAQ-R total scale ($p = 0.013$) and pain willingness ($p = 0.001$), but not for the activities engagement scale ($p = 0.431$). The results of the linear mixed modeling analyses conducted for the CPAQ-R total and subscale scores can be found in Table 4.

Secondary Process Analyses

The first hypothesis was only partially supported with regards to the results of the secondary process variables, with only the traditional cognitive-behavioural measures (e.g., TSK11 and PCS) showing changes in the predicted direction. While there was a significant treatment by time interaction noted on the measure of valued living (VLQ), it was due to the online ABBT + TAU group showing a reduction in the composite score from post-treatment to

follow-up. The TAU alone group scores remained stable throughout the study period. Main effects of time were also noted on the VLQ. The measure of cognitive fusion (CFQ) similarly showed a significant treatment by time interaction due to the online ABBT + TAU group showing increases (as opposed to predicted decreases) in cognitive fusion from post-treatment to follow-up. No main effects were noted. No significant treatment by time interaction effects were noted for any of the mindfulness scales; however, main effects of time were noted on the observe ($p = 0.004$) and describe ($p = 0.032$) subscales of the FFMS.

For the traditional cognitive-behavioural process variables studied, significant improvements were noted for the participants who received online ABBT + TAU, relative to the TAU alone group, on the helplessness subscale ($p = 0.031$) of the PCS, and the total score for kinesiophobia (TSK-11) ($p < 0.001$) and the activity avoidance ($p < 0.001$) subscale of the TSK-11. Main effects of time were also noted on all of the above. The results of the LMM analyses conducted for each total and subscale score can be found in Table 4.

Physical Measures

No significant treatment by time interactions were noted on the physical testing measures; however, main effects of time were noted on the sit-to-stand task and the pain test of the TSA. While not significant, the treatment by time interactions on the walk task ($p = 0.068$) were suggestive of improvements in the predicted direction (See Table 4).

Mediation Analyses

The results of the longitudinal mediation analysis can be viewed in Tables 5-9 and partially supported the second hypothesis. Increases in overall acceptance from pre- to post-treatment mediated the effects of treatment on pre-treatment to follow-up improvements in fibromyalgia quality of life (FIQ-R; $b=13.31$, $p < 0.05$) and the impact subscale of the FIQ-R (b

=2.02, $p < 0.05$). Increases in pain willingness from pre- to post-treatment also mediated the effects of treatment on pre-treatment to follow-up improvements in fibromyalgia quality of life (FIQ-R; $b = 11.93$, $p < 0.05$) and the impact subscale of the FIQ-R ($b = 3.2$, $p < 0.05$). Pre-to-post treatment reductions in helplessness (PCS-Helplessness subscale) mediated pre-treatment to follow-up improvements in overall ($b = 7.42$, $p < 0.05$), sensory ($b = 5.24$, $p = 0.05$), and affective ($b = 2.18$, $p < 0.05$) pain scores on the MPQ. No other significant mediations were noted.

Treatment Integrity and Engagement

Participants in the online ABBT + TAU group were assessed on whether they logged in to the CAPSI-Therapy program, the number of written assignments that they submitted for each treatment unit, and their ratings of how often they practiced the exercises associated with each treatment component. It should be noted that participants were not required to submit written assignments in order to access the treatment materials and many participants elected not to do so.

Log-in information within the CAPSI-Therapy program indicated that 100% of participants in the treatment group accessed the treatment program at some point during the treatment period. The percentage of participants submitting unit assignments was as follows: unit 1 (31.3%), unit 2 (26.5%), unit 3 (20.5%), unit 4 (18.1%), unit 5 (15.7%), and unit 6 (14.6%). A completed unit assignment was defined as a participant having both submitted and passed a given unit. All participants who submitted unit assignments passed each unit, indicating they understood the materials.

Participants in the ABBT + TAU group indicated they practiced the treatment components regularly, with over 60% of participants indicating they practiced exercises from

each of the 6 core ABBT components at least once per day, and over 80% indicating they practiced more than once per week. Unfortunately, it was not possible to objectively determine how much time participants spent on each unit or if they completed some portion of all units given the current study design and options within the CAPSI-therapy program.

Participants in the ABBT + TAU group reported that they practiced willingness the most regularly (72% one or more times per day, 84% more than once per week) while cognitive defusion was reported to be practiced the least (88% more than once per week, 60% one or more times per day). Mindfulness, values, and observer self were reported to be practiced at least once per week by 92% of participants (68%, 64%, and 64% one or more times per day, respectively). Acceptance was reported to be practiced at least once per week by 84% of participants, with 68% reporting practicing the exercises associated with the concept one or more times per day.

Participant Global Ratings of Change

The differences noted above were consistent with participants' perceived ratings of change. Chi-square analyses indicated that significantly more members of the online ABBT + TAU group rated themselves as being improved, as compared to the TAU alone group, in overall FMS symptoms ($\chi^2 = 11.5, p = .001$), pain ($\chi^2 = 9.52, p = .002$), fatigue ($\chi^2 = 4.5, p = .034$), cognitive symptoms associated with FMS ($\chi^2 = 12.5, p < .001$), and overall daily functioning ($\chi^2 = 7.71, p = .005$) (See Figures 4-8). Despite significant differences noted between the groups overall, some participants in the treatment group reported their perception of their ability to live with overall symptoms related to FMS ($n = 12$), pain ($n = 16$), and values ($n = 10$) as not changed from their ability to do so prior to the treatment. Some participants in the treatment group also reported their perception that they were *less* able to cope with fatigue ($n = 9$), and the cognitive symptoms associated with FMS ($n = 9$) than prior to treatment.

Social Validity of Treatment

Feedback from participants in the online ABBT + TAU group both within the CAPSI-Therapy program and on the final questionnaires was examined for themes on how to improve the program, how easy participants felt it was to interact with and complete the program online, and how helpful they felt the treatment was at addressing their symptoms and ability to live their lives. Comments on the final questionnaires from the TAU alone group were also examined. While fewer than 30% of those participating elected to provide written comments, of those who did, over 90% indicated they found the materials easy to use and helpful. See Table 10 for a breakdown of common themes. Usefulness of the content was also examined using questions on the patient global evaluation scale. Participants in the online ABBT + TAU group rated their perceived usefulness of each module and were asked to rank them from most to least useful. A breakdown of participant responses can be seen in Figures 2 and 3.

Discussion

This study set out to determine if the CAPSI-Therapy program could be used to deliver an ABBT for FMS, and if the treatment materials provided within the CAPSI-Therapy program were effective in improving overall FMS symptoms and daily functioning. The results supported this main aim. Not only were the results of the LMM significant on the FIQ-R, but additional analysis also revealed that 21 of 30 participants in the ABBT + TAU group were deemed responders to the treatment.

Given that ABBTs delivered in a group format (i.e., Luciano et al., 2014; Wicksell et al., 2013) and online (Ljotsson et al., 2014) have been effective for treatment of FMS, and that the CAPSI-Therapy program has been effective in delivering CBT-based treatments for social anxiety (Simister, 2010), it was hypothesized that the treatment group (online ABBT + TAU)

would show significantly more improvement in their reported FMS quality of life including impact, symptoms, and daily functioning as compared with the control group (TAU alone), who only continued their prior treatment regime without receiving the CAPSI-Therapy-based ABBT. Further, it was hypothesized that one or more process variables (i.e., pain acceptance, cognitive fusion, valued living, mindfulness, catastrophizing, or kinesiophobia) would mediate any observed treatment effects. The results of this randomized controlled trial supported the study hypotheses. The online ABBT + TAU group significantly improved on fibromyalgia quality of life, including impact, symptoms, and functioning, relative to treatment as usual. These results were bolstered by the findings of the responder analysis, which revealed that a significantly greater proportion of participants treated with online ABBT were classified as responders. Further, the results revealed that pre- to post-treatment increases in pain acceptance significantly mediated pre-treatment to follow-up improvements in fibromyalgia quality of life and fibromyalgia impact.

Consistent with previous research (Buhrman et al., 2013; Ruhlman, Karoly, & Enders, 2012; Simister, 2010), the present study demonstrated that people can benefit from online treatment programs, and more specifically, online treatment for FMS (Ljotsson et al., 2014; Menga, et al., 2014). Further, the results were also consistent with findings in the literature which support the use of ABBT for FMS and other chronic pain conditions (Bailey, Carleton, Vlaeyen, & Asmundson, 2010; McCracken, MacKichan, & Eccleston, 2006; McCracken, Vowles, Gregg, & Almada, 2010; Vowles & McCracken, 2010; Wetherell et al., 2011; Wicksell et al., 2008).

In addition to changes in the primary outcome measures, the online ABBT + TAU group also improved significantly on secondary outcome measures of pain and depression (McGill & CES-D). It was expected that, across treatment conditions, some participants would show

improvements given that they continued their pre-study treatment as directed by their physician(s) and placebo effects are also possible in any treatment study. Indeed such main effects of time were noted for these variables. However, the significant treatment by time interactions suggest that those who received the online ABBT showed greater improvements than those who simply continued their pre-study treatment. While the final secondary outcome measure (sleep) did not show statistically significant change, there was a trend toward such improvement in the group who received online ABBT. Those who received the online ABBT also indicated on the global measure of change that they were more able to cope with fatigue than those who did not receive the online treatment.

It is very positive that improvements in depression and pain occurred for those who received the online ABBT, particularly when those outcomes were not directly targeted by the treatment. Some participants also reported improvements in sleep quality, though these did not reach statistical significance. Given the high rate of comorbid depression associated with chronic pain conditions in general, and FMS in particular, this is a very positive clinical finding; and suggests that the treatment had significant impact over and above effects of other treatments or the passage of time. Depression is often associated with increased disability and poorer treatment outcome, thus any incremental improvement is an important clinical finding. Aside from the benefits to the individual receiving treatment, there are potential indirect benefits to the larger population. Both depression and pain account for a large percentage of the impact of disability (Arnow, et al., 2009) on society and on individual's ability to live their lives. Thus, any treatment that can reduce levels of depression and the negative impact of pain stands to play an important role in reducing the cost of disability. Similarly, sleep difficulties are often reported by individuals with FMS and thus, any amount of improvement could be seen as beneficial.

Significant improvements were also seen in the online ABBT + TAU group, as compared with the TAU alone group, for several of the process variables studied. Consistent with prior research indicating ABBTs effectiveness at increasing acceptance and psychological flexibility (McCracken & Morley, 2014; McCracken & Vowels, 2014), overall acceptance and pain willingness increased significantly in those who received the online ABBT but not for those in TAU alone group. However, it was quite unexpected to find that scores on the activity engagement subscale of the CPAQ-R did not significantly improve as a result of treatment in this study. This finding is quite inconsistent with the results of previous studies as well as the significant reductions in activity avoidance (TSK-11) and significantly improved functioning scores (FIQ-R) that were observed in this study. There are at least three potential explanations for this difference. First, it is possible that the treatment had a greater impact on participants' *willingness* to experience pain, but relatively less impact on the actual behavioural steps of engaging in activities that participants perceive as causing increased pain. Given the treatment modality (online treatment) and study design, it is not possible to ascertain from the data collected if participants modified their behaviour and improved engagement with activities in their daily lives, or if they simply understood the importance of doing so. It is somewhat interesting and supportive of this hypothesis that overall, participants reported that they practiced the exercises associated with acceptance the least as compared with exercises from other treatment components. A second possibility is that participants did not have sufficient time during the treatment period to significantly increase their engagement in valued activities, even if they had completed recommended exercises. Given that two participants did comment they did not feel they had sufficient time to complete the treatment exercises, this potential explanation seems at least partially supported for some members of the online ABBT + TAU group. A third

possibility was that this result was due to an unexplained artifact within the context of this research study.

Of primary interest to this study were the findings that improvements in overall pain acceptance and pain willingness both mediated improvements in overall FMS quality of life and FMS impact. While not a significant mediator for the primary outcome measure, reductions in perceived helplessness were found to mediate improvements on overall reported pain symptoms in this study. Taken together, these results suggest that while perceived helplessness may impact one's perception of pain, acceptance, and pain willingness in particular, play a larger role in improving one's ability to function despite chronic pain and associated FMS symptoms. This result is consistent with prior research indicating that psychological flexibility and acceptance play a greater role in daily functioning and overall disability than the degree of symptoms experienced (Bailey, Carleton, Vlaeyen, & Asmundson, 2010; McCracken, Zayfert, & Gross, 1992).

The online ABBT + TAU group also showed significantly reduced fear-of-movement (kinesiophobia) scores as compared with the TAU alone group. This result is interesting in that, while participants reported reduced activity avoidance scores, they did not report a corresponding increase in their activity engagement scores on the CPAQ-R. One possible explanation for this contradictory finding is that even though the online ABBT group decreased their activity avoidance scores, their activity engagement scores may have been suppressed by other process factors such as valued living, cognitive fusion, and mindfulness, which did not appear to improve as a result of treatment. FMS sufferers often report a great deal of fear that by following recommendations for increasing their activity levels they may worsen their condition rather than improve it. Therefore, any intervention that encourages increases in activity and

actually helps people with FMS to increase their participation in activities should be implemented. The finding that those who received the online treatment reduced their sense of helplessness could also potentially contribute to increases in functional activity and valued living. It was also interesting to note that while reductions in perceived helplessness mediated reductions in the pain variables studied, which tended to be small and somewhat varied over the course of the study, increases in acceptance mediated improvements seen on the primary outcome measure, FMS quality of life, which tended to be larger and more consistent.

While prior research (Ljotsson, Andreevitch, Hedman, Ruck, Andersson, & Lindefors, 2010) has suggested that improved mindfulness is an important contributor to the successful treatment of chronic pain conditions such as FMS, the current study did not replicate this finding. Interestingly, participants in both groups appeared to improve their ability to observe and describe thoughts, feelings, and sensations at the end of the study period. It is not clear if reactivity from the baseline measures or some other unknown factor (e.g., information from sources outside of study treatment materials) may have contributed to this change.

Limited validation of the FFMS for treatment with people living with fibromyalgia or chronic pain also makes this result difficult to interpret. Curtis, et al. (2011) did find that the FFMS detected improvements in mindfulness in those with FMS following a yoga intervention, however, given the treatment in the Curtis, et al. study was so different from the current treatment, it is not possible to determine whether the online ABBT + TAU had no effect on mindfulness, or the FFMS simply was not able to capture such changes with this type of intervention. Alternatively, despite participant responses indicating that they perceive mindfulness to be an important component of treatment, they may not have practiced sufficiently, or have adequately mastered the skill to derive benefit during the treatment period.

Regular check-ins and problem-solving assistance for difficulties using the components of ABBTs are commonplace in face-to-face treatment. While participants were encouraged to submit written assignments, and to contact the researcher with questions or difficulties, few elected to seek out this assistance, thus limiting how confident we can be that participants did, in fact, fully engage with the materials. In prior research and treatment applications of the CAPSI-Therapy program, participants had limited access to treatment materials until they demonstrated they had read and worked through the previous sections. This restriction may have reduced the ability to determine level of mastery achieved in this study; however, the improvements observed on the primary and secondary outcome measures suggest that electing to allow participants to move through the treatment themselves and without restricting access was beneficial.

More difficult to explain than the results of the FFMS are the results of the VLQ and CFQ measures which showed significant group by time interaction effects, but in favor of the TAU alone group. It is important to note that scores on these measures were not significantly different between groups at baseline and did not change significantly from baseline to post-treatment for either treatment condition. However, during the follow-up period, cognitive fusion scores increased, and valued living scores decreased, only for the online ABBT + TAU group. When looking at component scores on the VLQ, it appears that participants in the online ABBT + TAU group rated the life domains as less important (lower importance scores) over time as opposed to reporting reductions in consistency. When only consistency scores were examined, no differences were noted between the groups.

It is unclear, based on these results, if participants in the treatment group did not benefit from the values or cognitive defusion units, did not understand the materials, did not continue to practice the exercises during the follow-up period, or had some type of negative reaction to the

treatment materials or test items as a result of treatment. Results of the participant global evaluations suggest that values and cognitive defusion strategies were generally seen as less important or helpful by participants as compared to the other units. Further, there is no research validating these tools in FMS, and only limited published research using them in chronic pain populations (McCracken, DaSilva, Skillicorn, & Doherty, 2014; Vowels, Wetherell, & Sorrell, 2009). Thus, it is possible that these measures may not adequately capture treatment-related changes in the aforementioned process variables within the FMS population.

Given that the current study was exploratory in nature, the results of the VLQ and CFQ suggest that further assessment of these components of ABBTs are needed, particularly once measures have been validated and found to be reliable within the FMS population or other chronic pain populations, more generally.

No significant treatment by time interaction effects were noted on the physical measures (cold and pain sensation, 6-minute walk, sit-to-stand). While not significant ($p=0.068$), the 6 minute walk test showed an overall trend for increased distance in the online treatment group as compared with the control group. These physical tasks were not specifically targeted by the online intervention but were included as part of a larger multidisciplinary investigation. One possible explanation for the lack of significant improvement in the 6-minute walk and sit-to-stand performances is that participants were not provided with any specific physical activity program that would have been expected to lead to improvements in the associated physical fitness parameters measured by these physical tasks. Another possibility is reflected in the corresponding lack of change in the activity engagement subscale of the CPAQ-R. However, this is contradicted by the fact that online treatment participants improved relative to the control participants on the function subscale of the FIQ-R. Uncontrolled factors such as weather, time of

day, or level of habitual physical activity outside of the scope of treatment in this study likely provide a better explanation for these results.

Aside from the quantitative results, qualitative feedback received from participants also supported the primary treatment goals of this study. Qualitative feedback was consistent with the overall primary quantitative results, suggesting that those in the treatment group believed they had improved more substantially in their ability to live with their FMS-related symptoms and pain. Participants also indicated that they were generally able to access the materials online, and appreciated having the flexibility to complete the treatment at a time and place that was convenient for them. While it is not possible to eliminate a potential positive response bias or placebo effect in their ratings given that participants were not blind to the treatment conditions during the course of the study, the combination of perceived improvements with the results of the standardized self-report measures (e.g., FIQR, McGill, CESD) lend support to improved overall functioning as a result of participating in the treatment.

Participants in the treatment group were generally confident in their ability to use the presented core components of acceptance, values, mindfulness, cognitive defusion, observer self, and willingness associated with the online ABBT. When asked to rank these components for contributing to any perceived changes in FMS symptoms and impact, most participants ranked mindfulness as the most helpful component. This result is particularly interesting given that standardized measures of mindfulness (e.g., FFM questionnaire) did not support increases in this component during the study period. It is possible that participants did not have sufficient time within the 2 month treatment window to practice and implement this complex skill within their daily lives, but still felt that continuing to practice it would provide a greater benefit to their overall health. There may also have been demand effects or possibly the familiarity with the

term, which has become ubiquitous in popular culture, that led participants to rate mindfulness as the most helpful component. A greater number of participants also ranked the observer self and acceptance components as the second and third most important contributors to treatment as compared to other core components included in the online treatment.

Overall, the results supported the primary goal of the study, which was to show that the CAPSI-Therapy-based ABBT could be an effective treatment program for people living with FMS. The results also suggested that not only was the treatment program effective, but treatment effects continued to be maintained at 3 months post-treatment.

Limitations

Every effort was made to recruit a sufficient number of participants to ensure adequate power for statistical analyses in the study. Unfortunately, fewer than the desired number of participants were initially enrolled in the study. This was due to a combination of factors including fewer referrals than anticipated and difficulties with having participants attend in-person sessions. As a result, some of the power to detect significant treatment effects was lost due to having fewer participants complete the study. This was particularly true for the mediation analyses, which did not have the benefits associated with LMM for addressing missing data, resulting in a substantive reduction in power.

The requirement of three in-person sessions also limited participation to those who believed they would be able to attend the sessions. This potentially eliminated people who may have been in a position to most benefit from the online delivery such as those who had symptoms that prevented or made it more difficult to attend appointments, or those living in distant rural areas. Further, the majority of the participants were female, limiting the ability to generalize the findings to men with FMS. While FMS is typically diagnosed more frequently in women, having a more accurate balance that reflects the 3:1 ratio within the reported gender of participants in the

study would improve generalizability. It would have also been beneficial to have a larger sample size with such a stratified sample in order to determine if sex moderates outcomes or the overall experience of FMS. A larger sample (and therefore having more individuals complete the treatment program at any given time) may have facilitated the inclusion of the planned peer-review component, which, unfortunately, needed to be dropped as participants indicated they were not receiving feedback quickly enough from peers for the feedback to be helpful.

Measures were not administered during the treatment period in this study. As such, it was not possible to determine at what point during treatment different components of the online ABBT became effective. Measuring constructs over the course of treatment may enhance mediation analyses, by allowing for a greater specification of when improvements occur in process and outcome variables and the resulting order of these changes. In this study, it was assumed that using pre- to post-treatment changes in process variables to assess for mediation of pre-treatment to follow-up changes in outcome variables would, despite some overlap in time, partially ameliorate this problem of what changes first. However, it should be recalled that the results of the mediation analysis were still correlational in nature and do not imply causality. Additionally, not all components of ABBT were measured in the study (i.e., self-as-context and committed action) and despite attempts to measure values, cognitive fusion, and mindfulness, it remains somewhat questionable whether the chosen measures provided adequate assessments of these components for the FMS population studied. In addition to measuring ABBT components throughout the study, a limitation of the CAPSI-Therapy online system was that we were not able to accurately track how much time participants spent logged in to the system, nor were we able to measure how much time participants spent completing experiential exercises.

The results of the study did support maintenance of treatment effects seen at post-treatment; however a longer follow-up period would be necessary to determine how long those treatment effects can be maintained. A longer follow-up period may also indicate additional treatment effects if participants receive any form of increasing benefit with increased practice of the skills. This may be especially true for more subtle and complex skills such as mindfulness.

A further limitation of this study is its almost exclusive reliance on self-report. While we attempted to limit potential confounding variables such as changes to pre-study treatments, information was obtained only from participants themselves as opposed to a more objective measure such as chart review or direct observation. A chart review or more detailed questioning may have revealed other differences between the groups such as dosages of medications, frequency of adjunctive treatments such as physiotherapy, or differences on demographic variables not collected (e.g., SES). Further, all but the physical measures that were a part of the larger study were self-report and thus relied on participants' perception of changes in their daily lives as opposed to observations or other measures of functioning such as number of days of work or other activities missed due to FMS.

Given the substantial number of main effects for time noted, it is possible that the results relate to treatment effects from other treatments outside of what was presented in the study, or the effects of participating in a research study. We attempted to address this confound by asking that participants maintain their pre-study treatment, and by including a control group; however it is not possible to rule out these effects. In addition, participants did report that they did not change their treatment over the course of the study; however it is acknowledged that self-report may be inaccurate. Obtaining permission to confirm pre-study treatments and any changes during the course of the study by alternative sources such as the participants' physician would

have added strength to the report. The study did not include any form of alternative active treatment as a comparison for ABBT, resulting in participants either receiving study treatment or simply continuing with pre-study treatment regimes. This limitation may have resulted in biased results that could be minimized if a participant group who were receiving some other form of active treatment (e.g., relaxation training) could serve as an additional comparison group.

Future Directions

As with other chronic pain conditions, prescribed medication is a primary treatment approach for a majority of people living with FMS. And given that people living with FMS are often prescribed more than one modality of treatment, it may be less informative to conduct similar studies in the future without including additional treatment arms, alone or in combination, reflecting this multidisciplinary approach.

Continuing to expand on the current study design with additional treatment arms for medication and other modalities such as physical exercise, yoga, or aquasize is a natural progression. Replication studies with larger samples may help to further illuminate potential mediation effects and other treatment effects that may have been lost or minimized due to lower participant numbers included in the analysis. Further validation of measures designed to examine components of online ABBT in those with FMS and, more broadly, chronic pain, is needed. Once appropriate measures are identified, it may also be helpful to measure online ABBT components throughout treatment as opposed to only before and after completion of treatment to further differentiate treatment effects. Additional information from participants such as whether they had completed assignments (without submitting any written assignments), how effective they were at practicing each skill, and explicit questions aimed at determining if participants avoided or had difficulty with particular components would also help clarify the results found in

the current study and should be included in future research. Updating the CAPSI-Therapy program to allow participants' to log their time spent on specific activities within the program such as viewing videos or downloading/reading content may also provide an additional tool to monitor treatment adherence and track the number and type of daily activities they engage in as a somewhat more precise measure of functioning over time. That said, given that participants downloaded written treatment materials, it may not be possible to accurately log how much time they are spending reading the content. Having the materials in written form that could be downloaded to be printed or read from an alternative media (e.g. an ipad not connected to the internet) was one of the recommendations from the participants of the pilot study, who reported having difficulty remembering all of the information presented to them in individual or group (in-person) sessions despite the inclusion of short information sheets. Thus the benefit of continued use of downloadable content may outweigh the limitation of having less control to track time spent on the CAPSI-Therapy program. The current study did ask participants how much time they spent practicing each component of the treatment; however future research may benefit from more detailed questions about time spent reading materials, practicing specific exercises, and viewing content. Inquiring about these various types of information throughout the treatment period as opposed to waiting for post-treatment or follow-up measures would be beneficial; however the benefits of this added information would have to be weighed with the added effort needed from participants, which could deter potential participants from engaging with the study.

Direct comparison of different treatments offered in an online environment as opposed to relying exclusively on a treatment-as-usual control may be necessary to help explain some of the results in the current study. Extending the follow-up period to at least one year is also warranted.

A few participants did comment that they did not feel they had sufficient time to cover the materials within the 2-month treatment window. It is not clear how much time would be necessary, and if longer treatment periods would increase completion rates of the homework assignments or impact the overall treatment effect but this may be another alternative expansion of the current study.

Despite efforts to allow participants flexibility in accessing treatment in order to improve treatment adherence, the way the treatment was offered also resulted in a very low percentage of participants actually submitting written assignments. As previously discussed, this result does not necessarily mean that participants did not read the treatment materials or complete any of the recommended exercises, but only that they did not make use of submission of written assignments to obtain feedback. The results do, however, bring into question the level of adherence to the treatment, as, other than the self-reported amount of practice for each component, limited information is available regarding the amount of time and effort spent by participants on the treatment.

Atreja, Bellan, and Levy (2005) published six seminal recommendations to improve treatment adherence. The current study attempted to include these strategies, with mixed success. Recommended strategies of simplifying the treatment regime by tailoring the treatment to the specific population, attempting to impart knowledge to participants through discussion on the purpose of the study and psychoeducational materials within the treatment, leaving/reducing researcher bias by piloting the treatment with a small group of participants, and then incorporating the feedback into the larger study while also allowing participants to direct the order and timing of their own treatment, were addressed. Other strategies such as imparting knowledge by distributing information about the treatment to participants' medical team and/or

social network, improving communication by having more personalized reminders sent regularly to participants throughout the treatment period, and assessing participants' perceptions of possible changes to their experience (e.g., symptoms, daily functioning, etc.) with FMS may further assist with treatment adherence in future studies. Providing additional communications to participants' social network and medical team (with permission) may be an avenue of particular success as participants expressed during their in-person visits and in their final comments a desire for the information to be shared with these individuals. While sharing of information may be perceived as beneficial to participants, it may also provide an additional benefit of peer support and encouragement for completing the treatment materials given that the participants will have more contact with these sources, both during and following the study, than with the study team. Aside from the strategies recommended by Atreja, Bellan, and Levy (2005), additional strategies that capitalize on behaviour management principles such as providing direct contact via phone to participants after they complete a specific amount or component of the treatment program, or providing access to additional content upon submission of assignments may increase the number of assignments submitted. Alternatively, finding alternative means of increasing the interactions between participants such as by having participants start at the same time and make use of an electronic discussion platform to encourage peer-support may also improve adherence.

Finally, while initially planned, participants were not able to provide feedback to other participants on their homework assignments given the constraints of how the study and the treatment program were set up. In the current study, participants needed to receive feedback prior to being able to submit a homework assignment for subsequent units. Since there was no penalty for participants who did not respond to requests by the CAPSI-Therapy program for them to

review other participants' homework, those submitting homework assignments had to wait for unpredictable and potentially very long periods to receive any feedback. An increased number of participants completing the study at the same time as opposed to in a staggered fashion as in the current study, some other method of ensuring feedback is received in a timely manner such as reduced anonymity, or changes to the program to allow participants to submit later unit assignments while still receiving feedback for previous units may help improve the opportunities for participant interactions within the online treatment program; however, these options each have their own drawbacks and their relative risks and benefits would need to be carefully considered.

Social Implications

An increasing number of individuals are being diagnosed with FMS, but the exact etiology and any curative treatment remains elusive. Effective treatments, particularly ones that have the potential to reach large numbers of individuals with minimal ongoing face-to-face delivery by health care practitioners, are necessary. ABBTs and other treatments that promote positive changes in acceptance and valued living are particularly important for conditions such as FMS and chronic pain where a focus on symptom reduction (e.g. reduced pain, fatigue) appears to be less obtainable, even by an ever increasing number of available medications. This study has contributed to the literature on the effectiveness of online interventions for a number of different mental and physical health conditions. Given the high rate of disability associated with chronic pain conditions, it is essential from both a clinical and social impact perspective to identify effective treatments than can be readily accessed by those living with these conditions. The current study, while preliminary, suggests that those with FMS can benefit from an online ABBT with very minimal additional monitoring or direction by a health-care practitioner.

Evidence from this study also suggests that acceptance, as opposed to a reduction in symptoms, plays a greater role in improving FMS quality of life and functioning. It further suggests that such effective treatment can be delivered to many people who would otherwise be unable to access it in a cost-effective manner. Future research should continue to focus on the further development of accessible and cost-effective methods of delivering effective treatments for people with FMS and other chronic pain conditions.

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Table 1: Demographic Variables

	Treatment	Control
N	30	31
# male participants	1	2
Mean Age	36.3	39.6
Mean years since diagnosis	3.9	3.1
<hr/>		
# per Education level		
Less than high school	5	3
High school	10	8
College or undergraduate degree	8	13
Graduate or professional degree	7	7
<hr/>		
# per Occupational status		
Full time	8	6
Part time	5	4
On disability	9	9
Retired	8	11
Other	0	1

Table 2: Summary of Self-report Measures

Measure Name	Acronym	Construct Measured
Primary Outcome Measure		
Fibromyalgia Impact Questionnaire- Revised	FIQ-R	Symptoms, impact of symptoms, and daily functioning related to Fibromyalgia
Secondary Outcome Measures		
Centre for Epidemiological Studies Depression Scale	CES-D	Level of depressive symptoms
McGill Pain Questionnaire-Short Form	SF-MPQ	Pain symptoms
Pittsburgh Sleep Quality Index	PSQI	Sleep quality and quantity
Primary Process Measures		
Chronic Pain Acceptance Questionnaire	CPAQ	Acceptance related to living with chronic pain
Secondary Process Measures		
Cognitive Fusion Questionnaire	CFQ	Amount of fusion (e.g., getting stuck with) thoughts
Valued Living Questionnaire	VLQ	Perceived importance and self-reported consistency of meeting 10 core values
Five Facet Mindfulness Questionnaire	FFMQ	Five components of mindfulness (e.g., Describe, observe, acceptance, nonreaction, nonjudgement)
Pain Catastrophizing Scale	PCS	Extreme/rigid thinking associated with living with chronic pain
Tampa Scale of Kinesiophobia-11	TSK-11	Fear of movement (e.g., Kinesiophobia)
Other		
Demographic Questionnaire	N/A	Relevant information about participants
Participant Global Rating of Change	N/A	Participant perception of changes in various concepts associated with the study (e.g., pain, FMS symptoms, ability to use components of ACT)

Table 3: Means and standard variations for study variables

	Online ABBT + TAU group			TAU alone group		
	Baseline	Post-treatment	Follow-up	Baseline	Post-treatment	Follow-up
Primary Outcome Measure						
FIQR						
FIQR Total	55.83(3.04)	39.0 (2.41)	31.96(2.59)	55.28 (3.0)	55.30 (2.30)	53.79 (2.57)
FIQR Function	16.1(1.22)	10.5 (1.06)	8.12 (1.0)	15.73 (1.2)	16.43 (1.0)	15.5 (1.0)
FIQR Impact	30.33(1.36)	22.41 (1.2)	18.51(1.27)	30.0 (1.34)	29.45 (1.13)	28.07 (1.26)
FIQR Symptoms	9.4 (0.90)	6.24 (0.71)	5.33 (0.79)	9.55 (0.88)	9.43(0.68)	10.34 (0.79)
Secondary Outcome Measures						
McGill						
McGill Total	26.07(1.64)	13.79 (1.58)	21.46(1.66)	25.84(1.6)	21.0 (1.48)	22.55 (1.65)
McGill Affective	6.2(0.60)	2.83(0.52)	5.59(0.56)	6.0(0.59)	4.77(0.48)	5.06(0.55)
McGill Sensory	19.87(1.18)	10.96 (1.27)	15.87(1.31)	19.84 (1.16)	16.23(1.19)	17.51 (1.30)
VAS	6.1(0.34)	5.74(0.32)	6.6(0.43)	5.81(0.34)	5.71(0.3)	5.4(0.43)
PSQI						
PSQI Total	12.67(0.70)	10.24(0.66)	10.66(0.90)	13.26(0.69)	13.0(0.63)	13.22(0.90)
CESD						
CESD Total	26.6(2.25)	17.72(2.10)	18.37(2.21)	27.81(2.22)	26.97(2.0)	24.99(2.2)
Physical Measures						
6-min walk	362.1(109.3)	350.5(135.5)	378.9(135.4)	351.1(92.0)	369.5(87.1)	353.7(114.9)
1-min sit-to-stand	15.1(1.3)	14.5(1.2)	16.0(1.3)	13.8(1.3)	15.2(1.2)	15.5(1.2)
TSA-Cold	28.6(.66)	28.8(.49)	28.7(.35)	29.4(.65)	28.9(.44)	29.3(.32)
TSA-Pain	15.3(1.3)	17.4(1.5)	19.4(1.3)	17.1(1.3)	18.1(1.4)	19.2(1.2)
Primary Process Measures						
CPAQ						
CPAQ Total	61.8(3.43)	72.0(3.16)	72.09(3.24)	58.58(3.37)	57.71(3.02)	58.11(3.24)

CPAQ Pain Willingness	23.77(1.69)	31.72(1.74)	31.85(1.57)	23.90(0.66)	24.26(1.66)	24.44(1.57)
CPAQ Activity Engagement	38.03(2.19)	40.12(1.95)	39.84(2.25)	34.67(2.15)	33.45(1.86)	33.49(2.25)
Secondary Process Measures						
CFQ						
CFQ Total	48.20(2.51)	47.06(2.55)	56.06(2.84)	49.65(2.47)	50.26(2.41)	45.86(2.82)
FFM						
FFM Describe	26.57(1.28)	24.16(1.55)	27.15(1.22)	24.16(1.26)	24.29(1.0)	25.05(1.20)
FFM Awareness	25.3(1.24)	26.06(1.24)	24.59(1.14)	21.52(1.22)	22.71(1.19)	23.37(1.13)
FFM Observe	28.1(1.09)	26.94(1.21)	31.07(0.96)	27.90(1.07)	28.99(1.16)	29.83(0.96)
FFM Nonjudgement	25.01(1.2)	27.32(1.2)	24.38(1.39)	24.97(1.18)	24.77(1.14)	25.22(1.38)
FFM Non response	20.0(0.82)	19.98(0.87)	21.67(0.96)	20.90(0.80)	20.74(0.82)	21.22(0.96)
FFM Describe	26.57(1.28)	24.16(1.55)	27.15(1.22)	24.16(1.26)	24.29(1.0)	25.05(1.20)
PCS						
PCS Total	25.53(2.22)	15.21(2.21)	18.73(2.09)	22.87(2.19)	19.39(2.1)	21.7(2.13)
PCS Rumination	9.13(0.83)	5.62(0.78)	6.94(0.70)	7.68(0.81)	6.68(0.74)	7.95 (0.71)
PCS Helplessness	11.5(1.06)	6.23(0.98)	7.9(1.0)	10.1(1.04)	8.65(0.92)	9.55(1.02)
PCS Magnification	4.9(0.57)	3.33(0.59)	3.91(0.58)	5.1(0.56)	4.07(0.56)	4.3(0.59)
TSK11						
TSK11 Total	27.77(1.14)	21.61(1.14)	23.19(1.17)	27.03(1.12)	27.45(1.07)	27.43(1.19)
TSK11 Somatic Focus	12.8(0.63)	10.99(0.57)	11.04(0.59)	12.87(0.62)	12.90(0.54)	12.58(0.6)
TSK11 Activity Avoidance	14.97(0.69)	10.7(0.76)	12.17(0.73)	14.16(0.68)	14.55(0.71)	14.88(0.74)
VLQ						
VLQ Composite	47.49(3.52)	44.52(3.39)	28.99(3.66)	40.30(3.46)	40.54(3.24)	38.48(3.80)

Note: FIQR= Fibromyalgia Impact Questionnaire-Revised; McGill= McGill Pain Questionnaire; CPAQ=Chronic Pain Acceptance Questionnaire; CESD= Center for Epidemiology Studies Depression Scale; PCS= Pain Catastrophizing Scale; PSQI= Pittsburgh Sleep Quality Index; TSK11= Tampa Scale for Kinesophobia-11; CFQ= Cognitive Fusion Questionnaire FFM= Five Factor Mindfulness Scale; VLQ = Valued Living Questionnaire

Table 4: Effect of Group, Time, and the Group*Time Interaction on Outcome and Process Variables

Variable	df ₁	df ₂	F	P	Partial eta ²
FIQR Total					
Group	1	57.42	15.61	<.0001	
Time	2	52.82	24.54	<.0001	
Group*Time	2	52.82	20.10	<.0001	.323
FIQR Function					
Group	1	58.47	12.15	.001	
Time	2	54.35	12.33	<.0001	
Group*Time	2	54.35	12.49	<.0001	.217
FIQR Impact					
Group	1	58.63	9.82	.003	
Time	2	54.42	5.75	.005	
Group*Time	2	54.42	8.58	.001	.142
FIQR Symptom					
Group	1	56.53	14.88	<.0001	
Time	2	53.02	29.40	<.0001	
Group*Time	2	53.02	16.01	<.0001	.260
CESD					
Group	1	59.85	6.78	.012	
Time	2	56.64	6.10	.004	
Group*Time	2	56.64	4.10	.022	.060
McGill Total					
Group	1	59.14	2.61	.112	
Time	2	54.71	21.90	<.0001	
Group*Time	2	54.71	4.54	.015	.086
McGill Sensory					
Group	1	59.14	3.42	.069	
Time	2	54.75	19.90	<.0001	
Group*Time	2	54.78	3.47	.038	.055
McGill Affective					
Group	1	57.46	0.52	.474	
Time	2	54.16	11.45	<.0001	
Group*Time	2	54.16	3.95	.025	.104
McGill VAS					
Group	1	59.01	1.78	.187	
Time	2	53.1	0.71	.496	
Group*Time	2	53.1	2.10	.133	.005
PSQI Total					
Group	1	59.39	5.33	.024	
Time	2	52.83	4.18	.021	
Group*Time	2	52.83	2.88	.065	.064

Variable	df ₁	df ₂	F	P	Partial eta ²
CPAQ Total					
Group	1	53.67	9.81	.003	
Time	2	52.13	3.44	.040	
Group*Time	2	52.13	4.73	.013	.056
CPAQ Activity Engagement					
Group	1	54.80	6.80	.012	
Time	2	53.57	0.06	.943	
Group*Time	2	53.57	0.86	.431	.018
CPAQ Pain Willingness					
Group	1	54.96	8.89	.004	
Time	2	52.88	9.90	<.0001	
Group*Time	2	52.88	8.09	.001	.077
PCS Total					
Group	1	28.91	0.43	.513	
Time	2	55.42	11.8	<.0001	
Group*Time	2	55.42	2.99	.058	.046
PCS Magnification					
Group	1	57.82	0.56	.456	
Time	2	53.76	6.08	.004	
Group*Time	2	53.76	0.27	.768	.006
PCS Helplessness					
Group	1	58.43	0.76	.389	
Time	2	55.81	11.5	<.0001	
Group*Time	2	55.81	3.71	.031	.045
PCS Rumination					
Group	1	59.68	0.07	.799	
Time	2	55.84	8.69	.001	
Group*Time	2	55.84	3.06	.055	.066
TSK11 Total					
Group	1	57.09	6.38	.014	
Time	2	53.24	8.02	.001	
Group*Time	2	53.24	10.65	<.0001	.130
TSK11 Activity Avoidance					
Group	1	58.21	6.28	.015	
Time	2	53.64	6.67	.003	
Group*Time	2	53.64	10.94	<.0001	.151
TSK11 Somatic Focus					
Group	1	56.78	3.53	.066	
Time	2	53.75	2.90	.064	
Group*Time	2	53.75	2.69	.077	.042
CFQ Total					
Group	1	59.20	0.47	.495	
Time	1	54.26	0.62	.543	
Group*Time	2	54.26	5.22	.008	.086

Variable	df ₁	df ₂	F	P	Partial eta ²
FFM Describe					
Group	1	58.10	1.16	.287	
Time	2	54.38	3.67	.032	
Group*Time	2	54.38	2.06	.137	.029
FFM Observe					
Group	1	58.28	0.03	.873	
Time	2	54.33	6.01	.004	
Group*Time	2	54.33	2.43	.098	.036
FFM Awareness					
Group	1	58.52	3.71	.059	
Time	2	53.53	1.19	.314	
Group*Time	2	53.53	1.47	.238	.006
FFM Nonjudgement					
Group	1	56.49	0.18	.673	
Time	2	51.61	1.03	.363	
Group*Time	2	51.61	1.77	.180	.025
FFM Nonreaction					
Group	1	58.58	0.18	.674	
Time	2	53.03	1.24	.299	
Group*Time	2	53.03	0.45	.642	.014
VLQ Composite					
Group	1	60.54	0.03	0.87	
Time	2	54.80	5.39	.007	
Group*Time	2	54.80	3.54	.036	.052
6 Min walk					
Group	1	59.23	.041	.841	
Time	2	27.45	1.35	.577	
Group*Time	2	27.45	2.97	.068	.043
1 min Sit-to-stand					
Group	1	59.09	.048	.827	
Time	2	53.23	3.37	.042	
Group*Time	2	53.23	1.95	.153	.013
TSA- Sensation					
Group	1	60.75	1.17	.285	
Time	2	55.96	.29	.752	
Group*Time	2	55.96	.52	.597	.011
TSA- Pain					
Group	1	58.18	.207	.651	
Time	2	51.78	6.77	.002	
Group*Time	2	51.78	.630	.537	.021

Table 5: Mediation effects of changes in overall acceptance (CPAQ total) on changes in outcomes

Outcome	Indirect effect (point estimate a*b)	Lower and Upper Bounds 95% CI
CES-D	-0.79	-6.11, 4.29
FIQR Total	-3.06	-7.91, -0.01
FIQR Function	-0.41	-1.91, 1.00
FIQR Symptoms	-1.48	-3.87, 0.01
FIQR Impact	-1.18	-2.71, -0.20
McGill Total	-1.60	-6.49, 1.52
McGill Sensory	-0.83	-3.90, 1.41
McGill Affective	-0.77	-2.73, 0.34

Note: Number of bootstrap resamples = 5000. The indirect effect is statistically significant when the confidence interval does not include zero. CI = confidence interval. 95% CI = $p < 0.05$ level of significance. Mediation analyses were restricted to variables with a significant treatment effect.

Table 6: Mediation effects of changes in pain willingness on changes in outcomes

Outcome	Indirect effect (point estimate a*b)	Lower and Upper Bounds 95% CI
CES-D	0.22	-5.38, 4.94
FIQR Total	-5.13	-11.36, -1.02
FIQR Function	-1.60	-4.09, 0.29
FIQR Symptoms	-1.86	-4.75, 0.08
FIQR Impact	-1.67	-4.04, -0.27
McGill Total	-1.17	-5.49, 2.03
McGill Sensory	-0.69	-3.65, 1.55
McGill Affective	-0.48	-2.17, 0.48

Note: Number of bootstrap resamples = 5000. The indirect effect is statistically significant when the confidence interval does not include zero. CI = confidence interval. 95% CI = $p < 0.05$ level of significance. Mediation analyses were restricted to variables with a significant treatment effect.

Table 7: Mediation effects of reduced helplessness (PCS-Helplessness) on changes in outcomes

Outcome	Indirect effect (point estimate a*b)	Lower and Upper Bounds 95% CI
CES-D	-1.19	-7.05, 1.37
FIQR Total	-2.00	-6.69, 0.04
FIQR Function	-0.88	-3.17, 0.04
FIQR Symptoms	-0.81	-3.13, 0.15
FIQR Impact	-0.26	-1.57, 0.54
McGill Total	-2.65	-6.89, -0.38
McGill Sensory	-1.89	-4.76, -0.25
McGill Affective	-0.76	-2.29, -0.09

Note: Number of bootstrap resamples = 5000. The indirect effect is statistically significant when the confidence interval does not include zero. CI = confidence interval. 95% CI = $p < 0.05$ level of significance. Mediation analyses were restricted to variables with a significant treatment effect.

Table 8: Mediation effects of changes in overall kinesiophobia (TSK11-Total) on changes in outcome

Outcome	Indirect effect (point estimate a*b)	Lower and Upper Bounds 95% CI
CES-D	-2.05	-8.80, 3.70
FIQR Total	1.96	-2.88, 7.61
FIQR Function	1.24	-0.77, 4.13
FIQR Symptoms	-0.43	-3.30, 2.08
FIQR Impact	1.15	-0.21, 3.07
McGill Total	0.59	-3.47, 4.84
McGill Sensory	0.81	-2.26, 4.10
McGill Affective	-0.21	-1.80, 0.90

Note: Number of bootstrap resamples = 5000. The indirect effect is statistically significant when the confidence interval does not include zero. CI = confidence interval. 95% CI = $p < 0.05$ level of significance. Mediation analyses were restricted to variables with a significant treatment effect.

Table 9: Mediation effects of changes in activity avoidance (TSK11-Activity Avoidance) on changes in outcomes

Outcome	Indirect effect (point estimate a*b)	Lower and Upper Bounds 95% CI
CES-D	-0.58	-6.39, 4.45
FIQR Total	0.90	-3.77, 6.27
FIQR Function	0.34	-2.24, 2.53
FIQR Symptoms	0.02	-2.40, 2.65
FIQR Impact	0.54	-0.75, 2.14
McGill Total	2.22	-1.15, 6.93
McGill Sensory	1.89	-0.82, 5.55
McGill Affective	0.33	-0.53, 1.54

Note: Number of bootstrap resamples = 5000. The indirect effect is statistically significant when the confidence interval does not include zero. CI = confidence interval. 95% CI = $p < 0.05$ level of significance. Mediation analyses were restricted to variables with a significant treatment effect.

Table 10: Comment themes

Comment Theme	Frequency of theme: ABBT+TAU group	Frequency of theme: TAU alone group
Treatment program is valuable	40%	0%*
Treatment program fills need due to limited resources available	50%	0%*
Not enough time to complete treatment materials	5%	0%*
Voiced dislike for primary medication treatment	10%	20%
Expressed desire to have other people understand FMS	20%	40%
Difficulty with amount of writing	5%	6%
Technical difficulties with questionnaires	0%	15%
Desire for more interaction between participants	5%	7%
Comments relating to desire to access treatment program	0%	18%

* Note: It was not anticipated that the TAU alone group would make comments regarding the treatment program as they had not received access to the treatment program at the time of the questionnaire administration. Frequencies represent greater than 100% as some comments fit multiple themes.

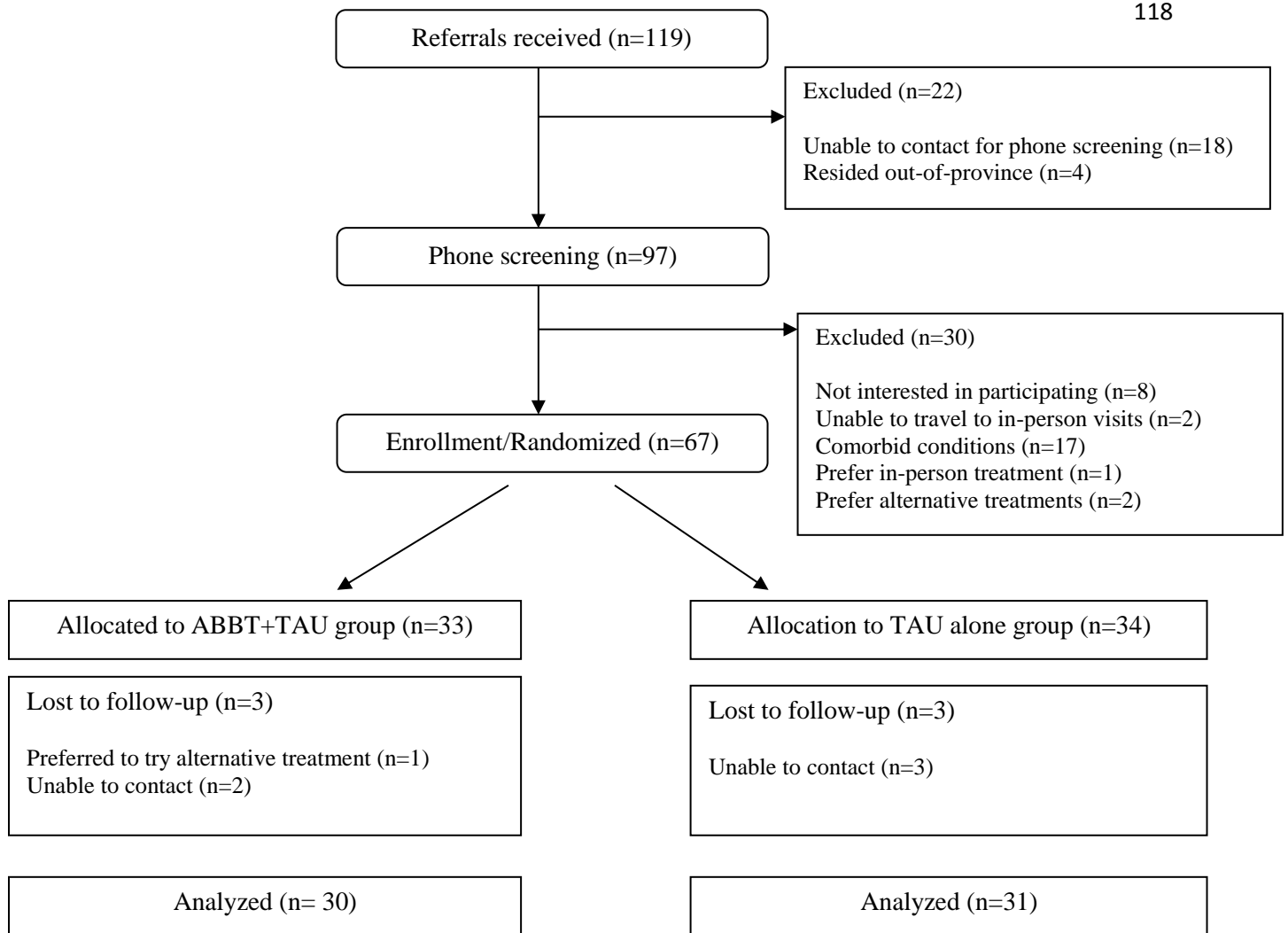


Figure 1: Participant Flow

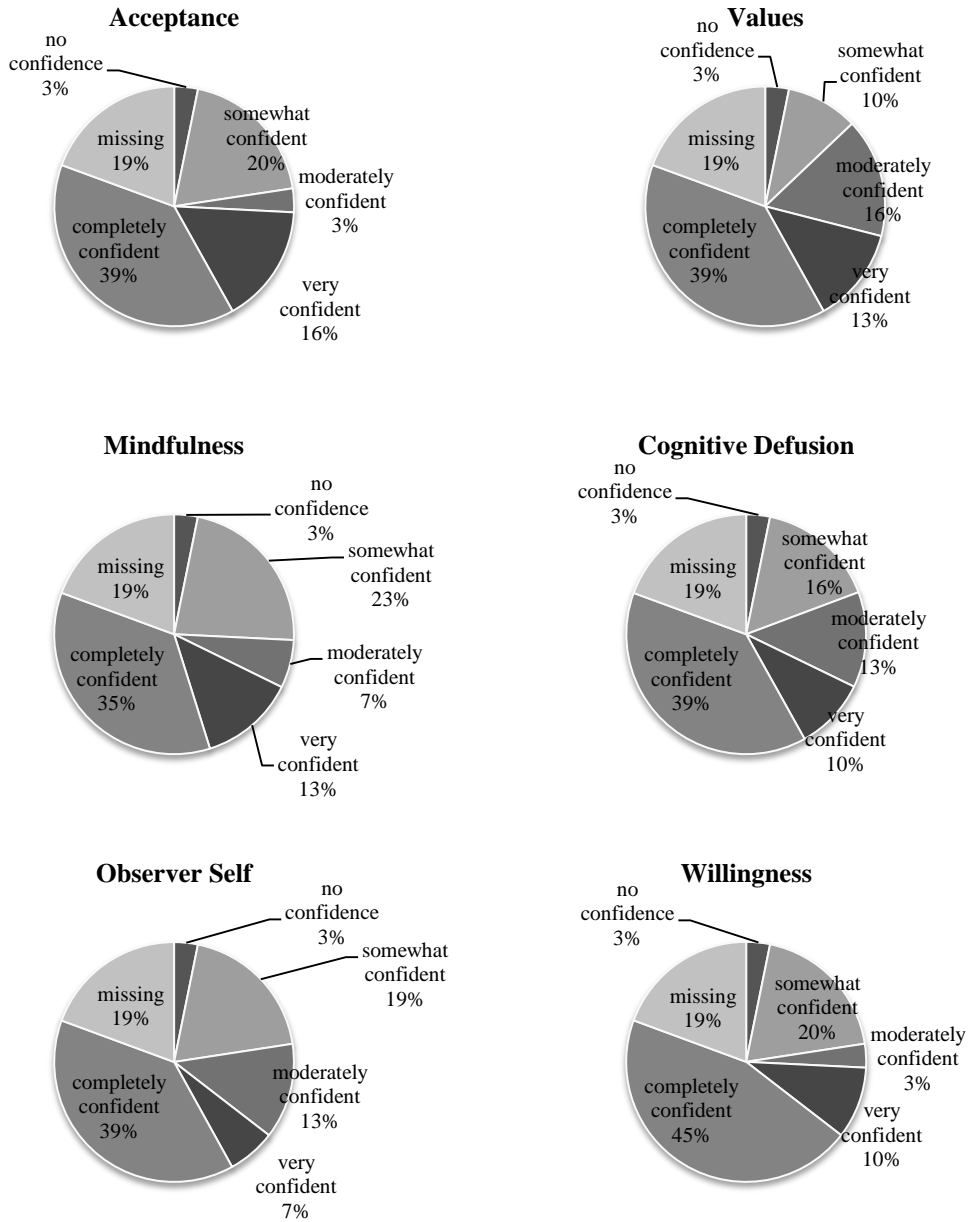


Figure 2: Participants' percentage ratings of confidence in their ability to use each of the identified ABBT strategies

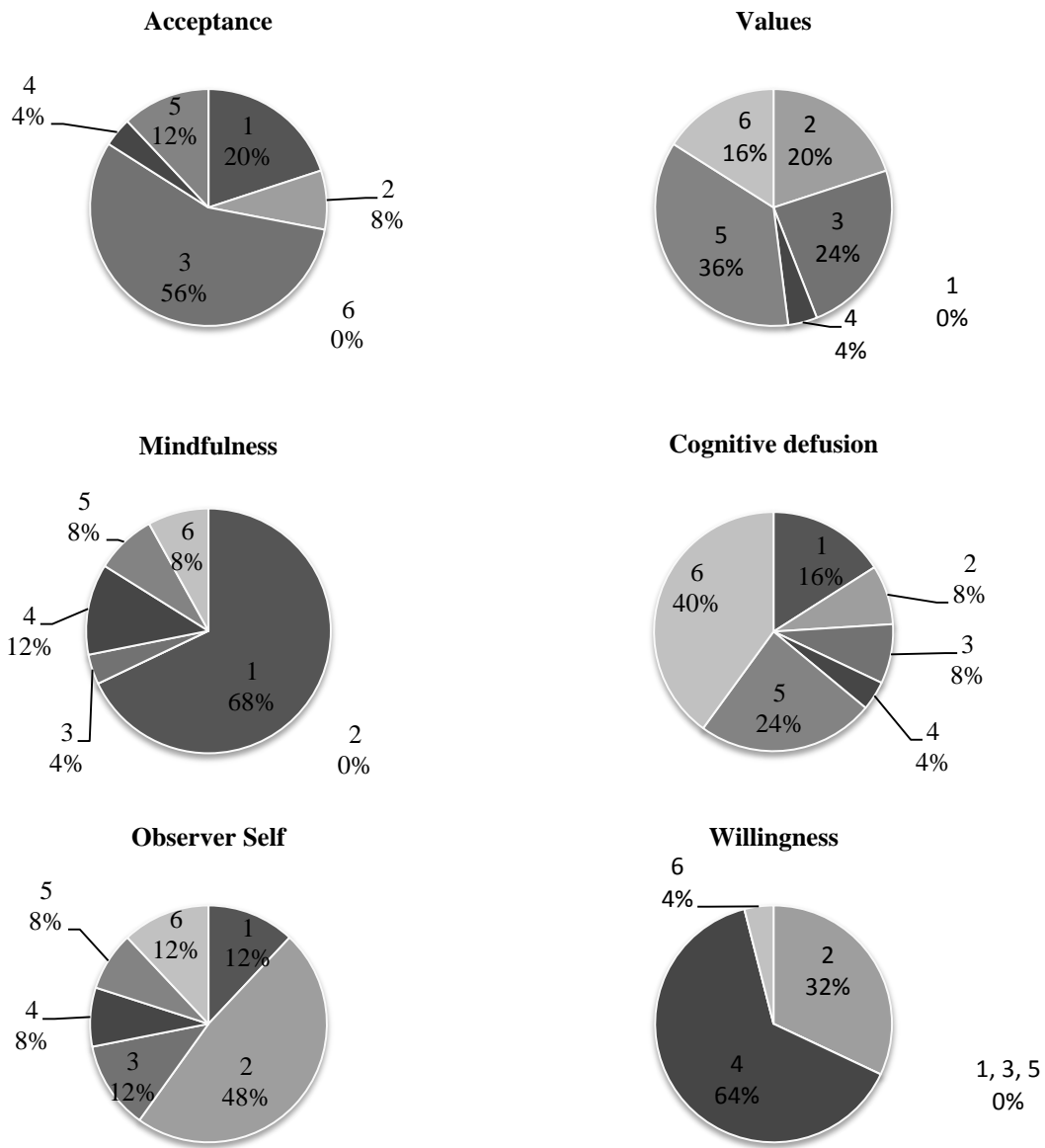


Figure 3: Participants' percentage rankings of the usefulness of each of the ABBT strategies (1= Most important, 6= Least important).

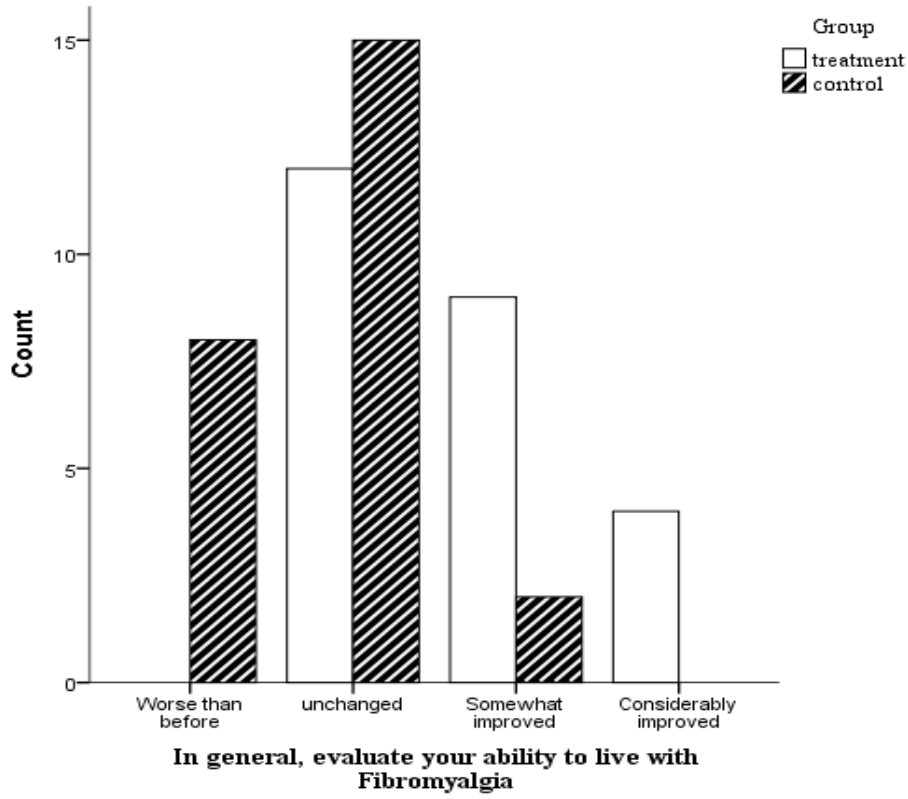


Figure 4: Participants' global ratings of their ability to live with FMS symptoms post treatment

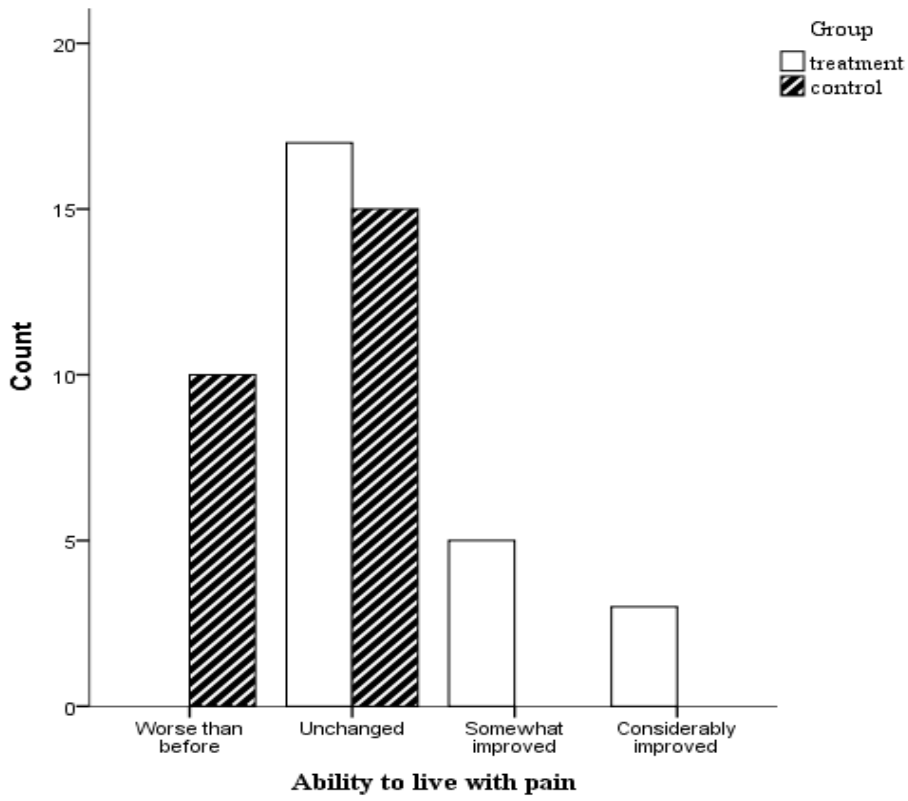


Figure 5: Participants' global ratings of their ability to live with pain post treatment

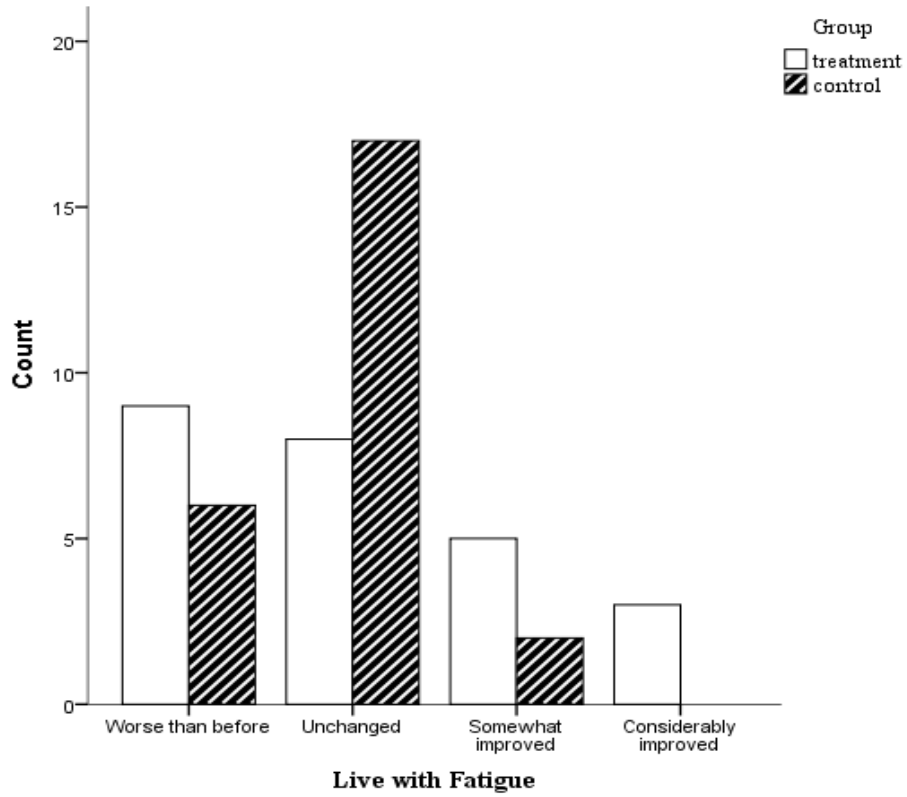


Figure 6: Participants' global ratings of their ability to live with fatigue post treatment

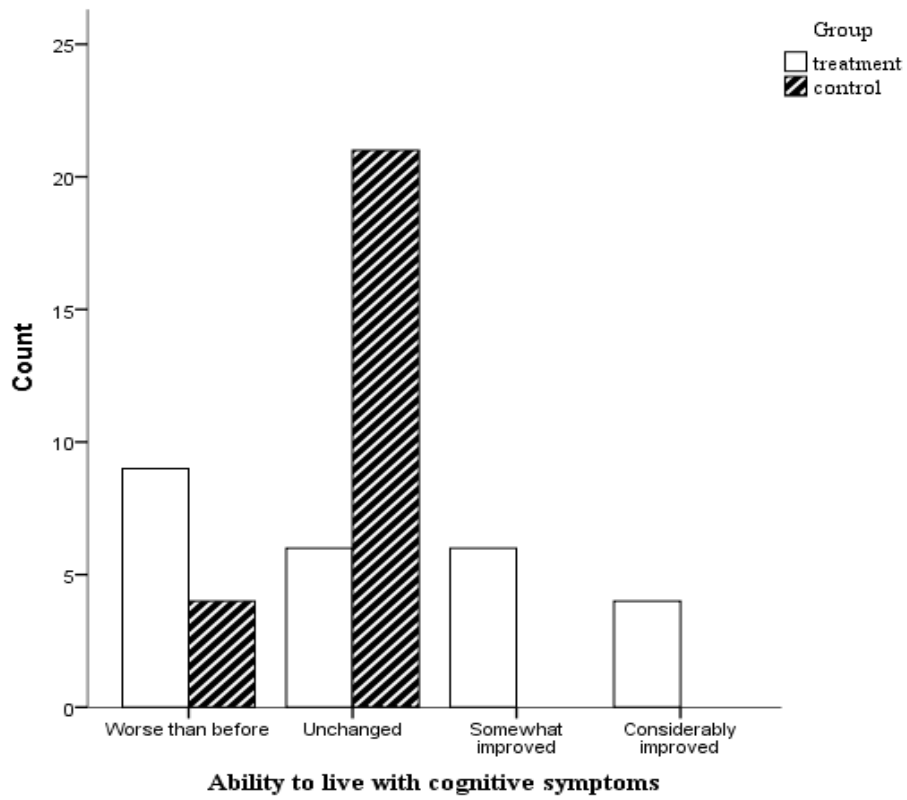


Figure 7: Participants' global ratings of their ability to live with cognitive symptoms ("Fibro Fog") post treatment

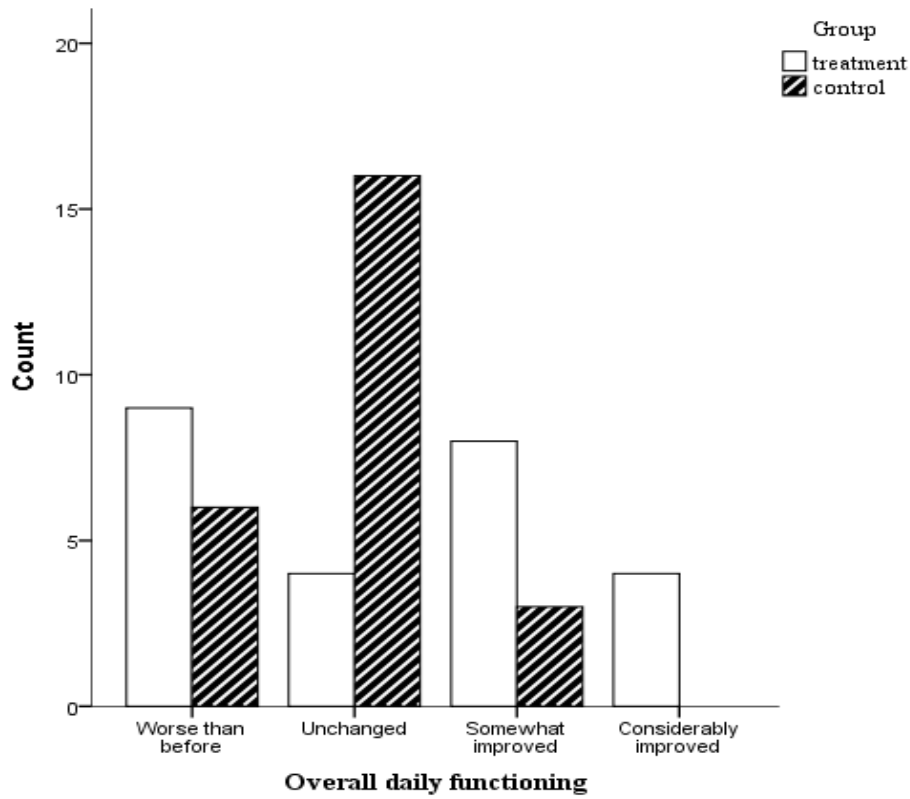


Figure 8: Participants' global ratings of their changes in daily functioning post treatment

Appendix A: Phone screening Questionnaire

Hello. I have received your name from Dr. _____ (or I have received a message from you), indicating you may be interested in participating in our study. We are investigating a new, online treatment for Fibromyalgia and are looking for people who have Fibromyalgia who would be interested in participating in the treatment trial. Has your doctor explained anything to you regarding this study?

(If pt doesn't describe the study): This study investigates a new treatment, developed with a team that includes psychology, physiotherapy, and medicine. The treatment was pilot-tested with a small group of people, and we are now attempting a larger trial, and investigating if we can deliver the treatment online in an effort to increase access to treatment. Aside from a multi-disciplinary approach to treatment, this new treatment is unique as it is designed to help you develop skills to be able to live a life you value, even though you have Fibromyalgia. You may be assigned to either a treatment group or to just continue your current treatment. If you are in the wait group, you may be offered the treatment at the end of the study (*Treatment will not be offered if any significant negative effects are noted such as significant worsening of symptoms*). The treatment will involve 8 sessions which are all completed online at a time and place that is convenient for you during a 3 month timeframe. The treatment will be offered free-of-charge to participants in the study. In addition to the treatment, you will need to answer some questionnaires online: once at the start of treatment, once after 3 months, and a third time after 6 months from when you started the study. Are you still interested? If Yes, skip to next paragraph. If No: Thank you for your time.

Yes: Great! I have a few questions to ask you to make sure you understand the study and so that we can reduce any chance that participating in the study will be a problem for you. Your answers will not affect which group you are assigned to should you decide to participate, nor will they affect your current treatment.

1. Are you 18 years of age or older right now? _____
2. When were you first diagnosed with Fibromyalgia? _____
3. What type of physician first diagnosed you? (i.e., Rheumatologist, Psychiatrist, Anesthesiologist, Neurologist, Family Physician, other) _____
4. Who is the physician who currently treats your Fibromyalgia and his/her medical specialty (see specialist list above) _____
5. Have you been diagnosed with any of the following?

<input type="checkbox"/> Rheumatoid Arthritis	<input type="checkbox"/> Lupus
<input type="checkbox"/> Multiple Sclerosis	<input type="checkbox"/> Lyme disease
<input type="checkbox"/> Chronic Fatigue Syndrome	

6. Do you have any other medical diagnoses that require ongoing treatment/monitoring?

7. I know your symptoms probably vary from day to day, but what do you think you would rate your average daily pain, on a scale from 0 (none) to 10 (worst ever)? _____
8. Do you currently have any active injury claims (e.g. MPI, WCB, private insurance?) _____
9. Have you ever had a medication abuse or substance abuse problem? (*current problem excluded*) _____
10. Have you ever been diagnosed with any of the following?
 _____ Schizophrenia _____ Bipolar disorder (manic depression)
 _____ Psychosis _____ Borderline Personality disorder
 _____ Severe Cognitive Impairment (i.e., traumatic brain injury, Dementia)
11. Have you recently been experiencing any active suicidal thinking (such that you are afraid that you might actually carry out a plan to kill yourself)? _____. **If yes, refer to Dr. Tkachuk or Dr. Bailly to follow up with them. Provide phone number for Klinik Crisis: 786-8686 or 1-888-322-3019.**
12. Are you willing to maintain your current treatment regime for the duration of this study or to let the study staff know if you change your treatment? (*That means will you agree not to change any medications you are currently on for your FMS, or start any alternative treatments such as physiotherapy, psychotherapy/psychological treatment, acupuncture, etc. You can maintain what you are currently doing. The reason we ask that you don't change your treatment is because this study is designed to investigate a new treatment for FMS and if you change something else you are doing, we may not be able to tell if any improvements are due to our treatment or other changes you have made.*)

13. This study makes use of the Internet to deliver the questionnaires and potential treatment via secure websites. Do you have regular access to a computer with a high-speed internet connection? Do you foresee any obstacles with you being able to go online on a weekly basis? (Sometimes people know they have trouble with access due to travel plans, internet _____ outages, _____ etc.)

14. You may be asked to read materials online. Have you completed at least grade 9 in school? Yes No Do you have reason to believe you would have trouble reading English or writing answers in English? (*Note: there is no time limit. You can take as long as you like to read and respond within the 3 months.*)

15. This study includes teaching people how to use something called mindfulness. Sometimes mindfulness is associated with specific religious ideas; however in this study,

it is not related to any religion. Instead, it is taught as a way to direct your attention. Do you have any religious/other concerns about the use of mindfulness?

If appropriate for the study:

Thank you for your time. At this point, we are contacting people who have been identified by their doctors or self-referred as potential candidates for this research study. People who are well-suited for this study will be contacted via email to participate. You will be given additional information at that time, and will have an opportunity to ask questions prior to consenting and moving ahead with the study. Most of the contact between people who participate in the study and the study team will be via email. Can we have your email address? _____

If not appropriate for the study:

Thank you for your time. At this point, we are contacting people who have been identified by their doctors or self-referred as potential candidates for this research study. Given your answers, participating in this study may put your health at risk or you may have too much trouble completing the study to obtain any benefit from it. Thank you for your interest in participating. Would you like to be informed of the outcome of the study? If so, please provide email address_____

Appendix B : Consent Form

(NOTE: This consent form appeared on letterhead when printed)

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

Title of Study:

“Online Acceptance Based Behavioural Treatment for Fibromyalgia.”

Ethics approval number: H2012:179

Related Protocol number: H2010:075, H2010:336

Principal Investigator: Dr. Ryan Skrabek, M.D.- [REDACTED]
Department of Physical Medicine
and
Ms. Heather Simister, M.A.
Department of Psychology

Clinical Supervisor to Ms. Simister: Gregg Tkachuk, PhD, CPsych - [REDACTED]
Department of Clinical Health Psychology
Pan Am Pain Clinic

You are being asked to participate in a human research study. Please take your time to review this consent form and discuss any questions you may have with the study staff. You may take your time to make your decision about participating in this study and you may discuss it with your friends, family or (if applicable) your doctor before you make your decision. This consent form may contain words that you do not understand. Please ask the study staff to explain any words or information that you do not clearly understand.

The study investigators have received financial support from the Health Sciences Centre Foundation to conduct this study.

Purpose of Study

This research study is being conducted to evaluate an online treatment for Fibromyalgia. You are being asked to take part in this study because you have been diagnosed with Fibromyalgia by a qualified physician. If you participate in this study, you will have a 50% chance of being randomly assigned to either an online treatment or a treatment-as usual group. A total of 100 participants will participate in this study, with 50 participants in the online study group and 50 in a treatment-as-usual group.

The proposed pilot study will evaluate the efficacy of a brief, online acceptance based behavioural therapy (ABBT) for patients with fibromyalgia. ABBT consists of strategies that promote the acceptance of, and willingness for experiencing the present moment, creating distance from thoughts, feelings, images, and sensations and helping patients reconnect to their most important values.

This research is being done because there is good evidence that acceptance-based therapy helps people with chronic pain, there have not been any randomized controlled studies of acceptance-based therapy for fibromyalgia. A small scale pilot study conducted in 2011 using an in-person treatment protocol supported the use of this treatment, with participants experiencing reduction in their FMS symptoms, fear of movement, and improved quality of life.

Study procedures

If you take part in this study, you will have the following tests and procedures:

Attend 1 in-person session at the beginning of the study where you will be asked to provide consent and given an opportunity to ask questions. You will also receive information on how to complete the study and be assigned to one of the two treatment conditions. During this session you will also complete baseline physical measures including a 6 minute walk test, a 1 minute sit-to-stand test, and a test of cold-induced pain tolerance. Thermal testing involves holding a small device designed to deliver different temperature gradients to the undersurface of your forearm. You will have an off-switch to control when to turn off the device. (60 minutes)

Attend 2 additional in-person sessions: one two months following the start of the study, and another 5 months after starting the study. These sessions will be to complete physical testing (6 minute walk test, 1 min sit-to-stand test and thermal pain tolerance testing). (60 minutes total @ 30 minutes per session).

Complete 3 assessment sessions at 3 timelines: baseline, in 2 months, and in 5 months (2 hours 10 minutes total @ 45 minutes each session). The assessments consist of 9 self-report questionnaires (totaling 190 items). Some general questions regarding your age, marital status, educational and employment information are also included for statistical purposes. At 2 months and 5 months, you may also be asked to complete a general treatment questionnaire (totaling 10 items). The questionnaires will be completed online so you do not need to attend additional sessions in person. Paper copies can be provided to you if you prefer, but you will need to ask the researcher for this option and attend in-person sessions to complete them.

Either complete a 6 unit, online Acceptance Based Behavioural Treatment while you continue with your current treatment or just continue with your current treatment, depending on which group you are assigned to. If you are in the online treatment group, these 6 units will include education and discussion of mindfulness, acceptance, pacing and exercise and other concepts as

they relate to fibromyalgia (6 hours total). If you are in the treatment-as-usual group you will be offered access to the online treatment at the end of the study.

Participation in the study will be three (3) in person sessions to provide consent and complete physical testing, up to six (6) online treatment units, and three (3) online questionnaire sessions for approximately 10 hours in total. This includes 6 online ABBT sessions and 3 evaluation/follow-up assessments.

The researchers may decide to take you off this study if it is in your medical best interest.

You can stop participating at any time. However, if you decide to stop participating in the study, we encourage you to talk to the study staff and your regular doctor first.

Risks and Discomforts

There is no anticipated significant risk or discomfort from participation in this study; however, it is possible that you may experience some anxiety or other distressing emotions related to the sensitive nature of the questions to be answered in the questionnaires or as a part of the treatment. In terms of the physical testing there is little risk involved. If you are not used to exercise, then you may feel discomfort in your muscles which could last up to 3 days. This is called delayed muscle soreness and it is a normal response to unaccustomed activity. Since both the sit to stand and 6 minute walk tests are self-limited, you will determine your maximum effort. You may also experience some mild discomfort during the thermal testing; however, the machine used for the test is programmed to turn off before any physical injury would occur.

Benefits

There may or may not be direct benefit to you from participating in this study. We hope the information learned from this study will assist in creating a tool and/or package designed to address the specific issues related to fibromyalgia using mindfulness and acceptance-based treatment (ABBT). This study will also provide information regarding if this type of online treatment can be delivered successfully to people with fibromyalgia, informing on potential alternative health-care delivery models to improve access to treatment.

Costs

All the assessments and ABBT treatment materials will be provided at no cost to you. You will be required to pay any parking expenses incurred during your in-person visit.

Payment for participation

You will receive \$75 for participating in this study, broken down into a \$25 payment following post-treatment study measures (at 2 months) and \$50 after completing the final (follow-up)

administration of the study measures. You will also be able to access this treatment free-of-charge.

Confidentiality

Information gathered in this research study may be published or presented in public forums; however your name and other identifying information will not be used or revealed. Medical records that contain your identity will be treated as confidential in accordance with the Personal Health Information Act of Manitoba. All study documents related to you will bear only your assigned study ID. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law or if it is necessary for your personal safety and the safety of others.

The University of Manitoba Health Research Ethics Board may review records related to the study for quality assurance purposes.

All records will be kept in a locked secure area and only those persons identified will have access to these records. If any of your medical/research records need to be copied to any of the above, your name and all identifying information will be removed. No information revealing any personal information such as your name, address or telephone number will leave the University of Manitoba.

Participants wishing to view results of the study once they are finished may do so by contacting the principal investigators for further details.

Voluntary Participation/Withdrawal From the Study

Your decision to take part in this study is voluntary. You may refuse to participate or you may withdraw from the study at any time without prejudice. Your decision not to participate or to withdraw from the study will not affect your other medical care. If the study staff feels that it is in your best interest to withdraw you from the study, they will remove you without your consent. You may also be recommended or referred for an alternative treatment, if the researchers believe it would be helpful or necessary.

We will tell you about any new information that may affect your health, welfare, or willingness to stay in this study.

Medical Care for Injury Related to the Study

You are not waiving any of your legal rights or releasing the investigator(s) or the sponsor(s) from their legal and professional responsibilities by signing this consent form.

Questions

You are free to ask any questions that you may have about your treatment and your rights as a research participant. If any questions come up during or after the study or if you have a research-related injury, contact the principal investigator Dr. Ryan Skrabek at [REDACTED]. You may also contact Ms. Simister via email at [REDACTED].

For questions about your rights as a research participant, you may contact The University of Manitoba Bannatyne Campus Research Ethics Board Office at (204) 789-3389.

Do not sign this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

Statement of Consent

I have read this consent form. I have had the opportunity to discuss this research study with Ms. Heather Simister, Dr. Gregg Tkachuk, and/or their study staff. I have had my questions answered by them in language I understand. The risks and benefits have been explained to me. I believe that I have not been unduly influenced by any study team member to participate in the research study by any statements or implied statements. Any relationship (such as employer, supervisor or family member) I may have with the study team has not affected my decision to participate. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this clinical trial is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study.

I understand that information regarding my personal identity will be kept confidential, but that confidentiality is not guaranteed. I authorize the inspection of any of my records that relate to this study by The University of Manitoba Research Ethics Board for quality assurance purposes.

By signing this consent form, I have not waived any of the legal rights that I have as a participant in a research study.

I agree to be contacted for future follow-up in relation to this study,

Yes ___ No ___

Participant signature _____

Date: _____

(day/month/year)

Participant printed name: _____

I, the undersigned, attest that the information in the Participant Information and Consent Form was accurately explained to, and apparently understood by, the participant or the participant's legally acceptable representative and that consent to participate in this study was freely given by the participant or the participant's legally acceptable representative.

Printed Name: _____

Date: _____

(day/month/year)

Signature: _____

Role in the study: _____

Relationship (if any) to study team members: _____

Appendix C: Demographic Questionnaire

User ID: _____

1. Age: _____

2. Gender: Male Female

3. Highest Education level completed: less than high school High school/GED

Undergraduate degree or College Diploma Graduate/Professional degree

4. Occupation status: full-time part-time disability student retired other

5. Year of formal diagnosis: _____

6. Current treatment(s) (e.g. medications, physiotherapy, injections, exercise, etc.):

7. Previous treatment(s): _____

Appendix D: Post-treatment Questionnaire

Participant Global Rating of Change

ID# _____

DATE _____

The following scale contains questions about components of our program. For each item, please circle the number that best reflects how well our program helped you to learn or achieve the following (*as compared to before the treatment program*):

Overall Evaluation

1. In general, evaluate your ability to live with fibromyalgia symptoms *during the past 4 weeks* (as compared to before the program).

0	1	2	3	4
Worse than before	Unchanged	Somewhat improved	Considerably improved	Completely improved

2. In general, evaluate your ability to live with bodily pain *during the past 4 weeks* (as compared to before the program).

0	1	2	3	4
Worse than before	Unchanged	Somewhat improved	Considerably improved	Completely improved

3. In general, evaluate your ability to live with fatigue *during the past 4 weeks* (as compared to before the program).

0	1	2	3	4
Worse than before	Unchanged	Somewhat improved	Considerably improved	Completely improved

4. In general, evaluate your ability to live with cognitive symptoms (i.e., Fibro fog) *during the past 4 weeks* (as compared to before the program).

0	1	2	3	4
Worse than before	Unchanged	Somewhat improved	Considerably improved	Completely improved

5. In general, evaluate your daily functioning *during the past 4 weeks* (as compared to before the program).

0	1	2	3	4
Worse than before	Unchanged	Somewhat improved	Considerably improved	Completely improved

6. In general, evaluate your overall commitment to living your life according to your chosen values *during the past 4 weeks* (as compared to before the program).

0	1	2	3	4
Not committed	Unchanged	Somewhat committed	Very committed	Completely committed

7. In general, how confident are you that you can independently practice strategies you were introduced to from the following areas?

	No confidence	Somewhat confident	Moderately confident	Very confident	Completely confident
Acceptance	0	1	2	3	4
Values	0	1	2	3	4
Cognitive Defusion	0	1	2	3	4
Mindfulness	0	1	2	3	4
Observer Self	0	1	2	3	4
Willingness	0	1	2	3	4

8. How often do you practice strategies from the following areas?

	Never	Once/week	More than Once/week	Once/ Day	More than Once/day
Acceptance	0	1	2	3	4
Values	0	1	2	3	4
Cognitive Defusion	0	1	2	3	4
Mindfulness	0	1	2	3	4
Observer Self	0	1	2	3	4
Willingness	0	1	2	3	4

9. Please indicate the strategies that were most helpful to you in order of preference from 1-6 (i.e., 1 = most helpful, 2 = second most helpful, etc.)

Acceptance _____

Values _____

Cognitive Defusion _____

Mindfulness _____

Observer Self _____

Willingness _____

10. Please circle the choice that best represents your overall evaluation of the group experience

0=not helpful 1=somewhat helpful 2=moderately helpful 3=very helpful 4=extremely helpful

11. Other than what you have learned in the study, have you changed or started any new treatments since starting this study? If yes, please describe the change(s).

Yes

No

Appendix E: Self-report Measures

REVISED FIBROMYALGIA IMPACT QUESTIONNAIRE (FIQR)

Directions: For each question, place an “X” in the box that best indicates how much your fibromyalgia made it difficult to do each of the following activities during the past 7 days

Brush or comb your hair

No difficulty Very difficult

Walk continuously for 20 minutes

No difficulty Very difficult

Prepare a homemade meal

No difficulty Very difficult

Vacuum, scrub or sweep floors

No difficulty Very difficult

Lift and carry a bag full of groceries

No difficulty Very difficult

Climb one flight of stairs

No difficulty Very difficult

Change bed sheets

No difficulty Very difficult

Sit in a chair for 45 minutes

No difficulty Very difficult

Go shopping for groceries

No difficulty Very difficult

Function sub-total
(for internal use only)

Directions: For each question, check the one box that best describes the overall impact of your fibromyalgia over the last 7days:

Fibromyalgia prevented me from accomplishing goals for the week

Never Always

I was completely overwhelmed by my fibromyalgia symptoms

Never Always

Overall Impact sub-total
(for internal use only)

Directions: For each of the following 10 questions, select the one circle that best indicates the intensity of your fibromyalgia symptoms over the past 7 days

Please rate your level of pain

No pain Unbearable pain

Please rate your level of energy

Lots of energy No energy

Please rate your level of stiffness

No stiffness Severe stiffness

Please rate the quality of your sleep

Awoke well rested Awoke very tired

Please rate your level of depression

No depression Very depressed

Please rate your level of memory problems

Good memory Very poor memory

Please rate your level of anxiety

Not anxious Very anxious

Please rate your level of tenderness to touch

No tenderness Very tender

Please rate your level of balance problems

No imbalance Severe imbalance

Please rate your level of sensitivity to loud noises, bright lights, odours and cold

No sensitivity Extreme sensitivity

Symptom sub-total

(for internal use only)

FIQR TOTAL SCORE

(for internal use only)

Bennett, R. M., Friend, R., Jones, K.D., Ward, R., Han, B. K. & Ross, R. L. (2009). The Revised Fibromyalgia Impact Questionnaire (FIQR): validation and psychometric properties. *Arthritis Research & Therapy* 2009, 11:R120
doi:10.1186/ar2783

ID: _____

Date: ____/____/____

C E S – D

Circle the number for each statement which best describes how often you felt this way during the past week.

Rarely None of the Time (less than 1 day)	or	Some or a Little of the Time (1-2 days)	or a	Occasionally or a Moderate Amount of the Time (3-4 days)	Most or All of the Time (5-7 days)
---	----	--	------	--	--

1. I was bothered by things that usually don't bother me0 1 2 3
2. I did not feel like eating; my appetite was poor0 1 2 3
3. I felt that I could not shake off the blues even with help from my friends0 1 2 3
4. I felt that I was just as good as other people0 1 2 3
5. I had trouble keeping my mind on what I was doing.....0 1 2 3
6. I felt depressed.....0 1 2 3
7. I felt that everything I did was an effort0 1 2 3
8. I felt hopeful about the future.....0 1 2 3
9. I thought my life had been a failure0 1 2 3
10. I felt fearful.....0 1 2 3
11. My sleep was restless0 1 2 3
12. I was happy.....0 1 2 3
13. I talked less than usual.....0 1 2 3
14. I felt lonely0 1 2 3
15. People were unfriendly.....0 1 2 3
16. I enjoyed life.....0 1 2 3

17. I had crying spells.....0	1	2	3
18. I felt sad.....0	1	2	3
19. I felt that people disliked me0	1	2	3
20. I could not get “going”0	1	2	3

Weissman, M M M. (1977). Assessing depressive symptoms in five psychiatric populations: a validation study. *American journal of epidemiology*, 106,3, 203-14.

THE MCGILL PAIN QUESTIONNAIRE- Short form

Part 1: Describe your pain by checking the appropriate spaces:

	NONE	MILD	MODERATE	SEVERE
THROBBING	0)_____	1)_____	2)_____	3)_____
SHOOTING	0)_____	1)_____	2)_____	3)_____
STABBING	0)_____	1)_____	2)_____	3)_____
SHARP	0)_____	1)_____	2)_____	3)_____
CRAMPING	0)_____	1)_____	2)_____	3)_____
GNAWING	0)_____	1)_____	2)_____	3)_____
HOT/BURNING	0)_____	1)_____	2)_____	3)_____
ACHING	0)_____	1)_____	2)_____	3)_____
HEAVY	0)_____	1)_____	2)_____	3)_____
TENDER	0)_____	1)_____	2)_____	3)_____
SPLITTING	0)_____	1)_____	2)_____	3)_____
TIRING – EXHAUSTING	0)_____	1)_____	2)_____	3)_____
SICKENING	0)_____	1)_____	2)_____	3)_____
FEARFUL	0)_____	1)_____	2)_____	3)_____
PUNISHING – CRUEL	0)_____	1)_____	2)_____	3)_____

Part 2: Place an “X” on the line to indicate your current level of pain.

No Pain _____ Worst Possible Pain

Part 3: Which word best describes the pain you are presently feeling?

- 0 NO PAIN _____
- 1 MILD PAIN _____
- 2 DISCOMFORTING _____
- 3 DISTRESSING _____
- 4 HORRIBLE _____
- 5 EXCRUCIATING _____

PITTSBURGH SLEEP QUALITY INDEX
INSTRUCTIONS:

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month.

Please answer all questions.

1. During the past month, what time have you usually gone to bed at night?

BED TIME _____

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?

NUMBER OF MINUTES _____

3. During the past month, what time have you usually gotten up in the morning?

GETTING UP TIME _____

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed.)

HOURS OF SLEEP PER NIGHT _____

For each of the remaining questions, check the one best response. Please answer all questions.

5. During the past month, how often have you had trouble sleeping because you . . .

a) Cannot get to sleep within 30 minutes

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

b) Wake up in the middle of the night or early morning

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

c) Have to get up to use the bathroom

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

d) Cannot breathe comfortably

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

e) Cough or snore loudly

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

f) Feel too cold

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

g) Feel too hot

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

h) Had bad dreams

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

i) Have pain

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

j) Other reason(s), please describe

How often during the past month have you had trouble sleeping because of this?

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

6. During the past month, how would you rate your sleep quality overall?

Very good _____	Fairly bad _____
Fairly good _____	Very bad _____

7. During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

No problem at all _____

Only a very slight problem _____

Somewhat of a problem _____

A very big problem _____

10. Do you have a bed partner or room mate?

No bed partner or room mate _____

Partner/room mate in other room _____

Partner in same room, but not same bed _____

Partner in same bed _____

If you have a room mate or bed partner, ask him/her how often in the past month you have had ...

a) Loud snoring

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

b) Long pauses between breaths while asleep

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

c) Legs twitching or jerking while you sleep

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

d) Episodes of disorientation or confusion during sleep

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

e) Other restlessness while you sleep; please describe

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

Chronic Pain Acceptance Questionnaire (CPAQ)

DIRECTIONS: Below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following rating scale to make your choices. For instance, if you believe a statement is "Always True," you would write a 6 in the blank next to that statement.

0	1	2	3	4	5	6
Never True	Very Rarely True	Seldom True	Sometimes True	Often True	Almost Always True	Always True

- _____ 1. I am getting on with the business of living no matter what my level of pain is
- _____ 2. My life is going well, even through I have chronic pain
- _____ 3. It's okay to experience pain
- _____ 4. I would gladly sacrifice important things in my life to control this pain better
- _____ 5. It's not necessary for me to control my pain in order to handle my life well
- _____ 6. Although things have changed, I am living a normal life despite my chronic pain
- _____ 7. I need to concentrate on getting rid of my pain
- _____ 8. There are many activities I do when I feel pain
- _____ 9. I lead a full life even though I have chronic pain
- _____ 10. Controlling pain is less important than any other goals in my life
- _____ 11. My thoughts and feelings about pain must change before I can take important steps in my life
- _____ 12. Despite the pain, I am now sticking to a certain course in my life
- _____ 13. Keeping my pain level under control takes first priority whenever I'm doing something
- _____ 14. Before I can make any serious plans, I have to get some control over my pain
- _____ 15. When my pain increases, I can still take care of my responsibilities
- _____ 16. I will have better control over my life if I can control my negative thoughts about pain
- _____ 17. I avoid putting myself in situations where my pain might increase
- _____ 18. My worries and fears about what pain will do to me are true
- _____ 19. It's a relief to realize that I don't have to change my pain to get on with my life

_____ 20. I have to struggle to do things when I have pain

McCracken, L. M., Vowles, K. E., & Eccleston, C. (2005). Acceptance-based treatment for persons with complex, long standing chronic pain: a preliminary analysis of treatment outcome in comparison to a waiting phase. *Behaviour Research and Therapy, 43*, 1335–1346.

Cognitive Fusion Questionnaire (CFQ13)

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7
never true	very seldom true	seldom true	sometimes true	frequently true	almost always true	always true

1. My thoughts cause me distress or emotional pain

1 2 3 4 5 6 7

2. I get so caught up in my thoughts that I am unable to do the things that I most want to do

1 2 3 4 5 6 7

3. Even when I am having distressing thoughts, I know that they may become less important eventually

1 2 3 4 5 6 7

4. I over-analyse situations to the point where it's unhelpful to me

1 2 3 4 5 6 7

5. I struggle with my thoughts

1 2 3 4 5 6 7

6. Even when I'm having upsetting thoughts, I can see that those thoughts may not be literally true

1 2 3 4 5 6 7

7. I get upset with myself for having certain thoughts

1 2 3 4 5 6 7

8. I need to control the thoughts that come into my head

1 2 3 4 5 6 7

9. I find it easy to view my thoughts from a different perspective

1 2 3 4 5 6 7

10. I tend to get very entangled in my thoughts

1 2 3 4 5 6 7

11. I tend to react very strongly to my thoughts

1 2 3 4 5 6 7

12. Its possible for me to have negative thoughts about myself and still know that I am an OK person

1 2 3 4 5 6 7

13. It's such a struggle to let go of upsetting thoughts even when I know that letting go would be helpful

1 2 3 4 5 6 7

Gillanders,D.T., Bolderston,H., Bond,F.W, Dempster,M., Campbell,L., Kerr,S., Tansey,L., Clarke,S., Remington,B., Flaxman,P.,Deans,G. (2010). *The Cognitive Fusion Questionnaire: Further developments in measuring cognitive fusion*. Conference presentation at the Association For Contextual Behavioral Science, World Congress VIII, Reno, NV, June 2010.

Valued Living Questionnaire

Below are areas of life that are valued by some people. We are concerned with your quality of life in each of these areas. One aspect of quality of life involves the importance one puts on different areas of living. Rate the importance of each area (by circling a number) on a scale of 1-10. 1 means that area is not at all important. 10 means that area is very important. Not everyone will value all of these areas, or value all areas the same. Rate each area according to **your own personal sense of importance**.

<u>Area</u>	Not at all important										Extremely important
1. Family (other than marriage or parenting)	1	2	3	4	5	6	7	8	9	10	
2. Marriage/couples/ intimate relations	1	2	3	4	5	6	7	8	9	10	
3. Parenting	1	2	3	4	5	6	7	8	9	10	
4. Friends/social life	1	2	3	4	5	6	7	8	9	10	
5. Work	1	2	3	4	5	6	7	8	9	10	
6. Education	1	2	3	4	5	6	7	8	9	10	
7. Recreation/Fun	1	2	3	4	5	6	7	8	9	10	
8. Spirituality	1	2	3	4	5	6	7	8	9	10	
9. Citizenship/Community Life	1	2	3	4	5	6	7	8	9	10	
10. Physical self care (diet, exercise, sleep)	1	2	3	4	5	6	7	8	9	10	

In this section, we would like you to give a rating of how consistent your actions have been with each of your values. We are **not** asking about your ideal in each area. We are also **not** asking what others think of you. Everyone does better in some areas than in others. People also do better at some times than at others. **We want to know how you think you have been doing during the past week.** Rate each area (by circling a number) on a scale of 1-10. 1 means that your actions have been completely inconsistent with your value. 10 means that your actions have been completely consistent with your value.

<u>Area</u>	<u>During the past week</u>									
	Not at all consistent with my value					Completely consistent with my value				
1. Family (other than marriage or parenting)	1	2	3	4	5	6	7	8	9	10
2. Marriage/couples/ intimate relations	1	2	3	4	5	6	7	8	9	10
3. Parenting	1	2	3	4	5	6	7	8	9	10
4. Friends/social life	1	2	3	4	5	6	7	8	9	10
5. Work	1	2	3	4	5	6	7	8	9	10
6. Education	1	2	3	4	5	6	7	8	9	10
7. Recreation/Fun	1	2	3	4	5	6	7	8	9	10
8. Spirituality	1	2	3	4	5	6	7	8	9	10
9. Citizenship/Community Life	1	2	3	4	5	6	7	8	9	10
10. Physical self care (diet, exercise, sleep)	1	2	3	4	5	6	7	8	9	10

Wilson, K. G., Sandoz, E. K., Kitchens, J., & Roberts, M. (2010). The valued living questionnaire: Defining and measuring valued action within a behavioral framework. *The Psychological Record, 60*(2), 249-272.

Five Facet Mindfulness Questionnaire

Description:

This instrument is based on a factor analytic study of five independently developed mindfulness questionnaires. The analysis yielded five factors that appear to represent elements of mindfulness as it is currently conceptualized. The five facets are observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. More information is available in:

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

1	2	3	4	5
never or very rarely true	Rarely true	sometimes true	Often true	Very often or Always true

- _____ 1. When I'm walking, I deliberately notice the sensations of my body moving.
- _____ 2. I'm good at finding words to describe my feelings.
- _____ 3. I criticize myself for having irrational or inappropriate emotions.
- _____ 4. I perceive my feelings and emotions without having to react to them.
- _____ 5. When I do things, my mind wanders off and I'm easily distracted.
- _____ 6. When I take a shower or bath, I stay alert to the sensations of water on my body.
- _____ 7. I can easily put my beliefs, opinions, and expectations into words.
- _____ 8. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.
- _____ 9. I watch my feelings without getting lost in them.
- _____ 10. I tell myself I shouldn't be feeling the way I'm feeling.
- _____ 11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.
- _____ 12. It's hard for me to find the words to describe what I'm thinking.
- _____ 13. I am easily distracted.
- _____ 14. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.
- _____ 15. I pay attention to sensations, such as the wind in my hair or sun on my face.
- _____ 16. I have trouble thinking of the right words to express how I feel about things
- _____ 17. I make judgments about whether my thoughts are good or bad.
- _____ 18. I find it difficult to stay focused on what's happening in the present.

- _____ 19. When I have distressing thoughts or images, I “step back” and am aware of the thought or image without getting taken over by it.
- _____ 20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
- _____ 21. In difficult situations, I can pause without immediately reacting.
- _____ 22. When I have a sensation in my body, it’s difficult for me to describe it because I can’t find the right words.
- _____ 23. It seems I am “running on automatic” without much awareness of what I’m doing.
- _____ 24. When I have distressing thoughts or images, I feel calm soon after.
- _____ 25. I tell myself that I shouldn’t be thinking the way I’m thinking.
- _____ 26. I notice the smells and aromas of things.
- _____ 27. Even when I’m feeling terribly upset, I can find a way to put it into words.
- _____ 28. I rush through activities without being really attentive to them.
- _____ 29. When I have distressing thoughts or images I am able just to notice them without reacting.
- _____ 30. I think some of my emotions are bad or inappropriate and I shouldn’t feel them.
- _____ 31. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.
- _____ 32. My natural tendency is to put my experiences into words.
- _____ 33. When I have distressing thoughts or images, I just notice them and let them go.
- _____ 34. I do jobs or tasks automatically without being aware of what I’m doing.
- _____ 35. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about.
- _____ 36. I pay attention to how my emotions affect my thoughts and behavior.
- _____ 37. I can usually describe how I feel at the moment in considerable detail.
- _____ 38. I find myself doing things without paying attention.
- _____ 39. I disapprove of myself when I have irrational ideas.

Everyone experiences painful situations at some point in their lives. Such experiences may include headaches, tooth pain, joint pain, or muscle pain. People are often exposed to situations that may cause pain such as illness, injury, dental procedures, or surgery.

We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

0	1	2	3	4
Not at All	To a slight Degree	To a moderate degree	To a great degree	All the time

When I am in pain...

1. I worry all the time about whether the pain will end. _____
2. I feel I can't go on. _____
3. It's terrible and I think it's never going to get any better. _____
4. It's awful and I feel that it overwhelms me. _____
5. I feel I can't stand it any more. _____
6. I become afraid that the pain will get worse. _____
7. I keep thinking of other painful events. _____
8. I anxiously want the pain to go away. _____
9. I can't seem to keep it out of my mind. _____
10. I keep thinking about how much it hurts. _____
11. I keep thinking about how badly I want the pain to stop. _____
12. There's nothing I can do to reduce the intensity of the pain. _____
13. I wonder whether something serious may happen. _____

Sullivan, Bishop, & Pivik, 1995 The Pain Catastrophizing Scale: Development and validation. *Psychological Assessment*, 7, 524-532

THE TAMPA SCALE (TSK-11)

In these days of high-tech medicine, one of the most important sources of information about you is often missing from your medical records: your own feeling or intuitions about what is happening with your body. We hope that the following information will help to fill that gap.

Please answer the following questions according to the scale listed on the right. Please answer according to your true feelings, not according to what others think you should believe. This is not a test of medical knowledge; we want to know how you see it. Circle the number next to each question that best corresponds to how you feel.

Please answer these questions by yourself. We want to know how you feel, not someone else.

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
People aren't taking my medical condition seriously enough.	1	2	3	4
My body is telling me I have something dangerously wrong.	1	2	3	4
My condition has put my body at risk for the rest of my life.	1	2	3	4
If I were to try to overcome it, my pain would increase.	1	2	3	4
Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening.	1	2	3	4
I wouldn't have this much pain if there weren't something potentially dangerous going on in my body.	1	2	3	4
Pain always means I have injured my body.	1	2	3	4
Pain let's me know when to stop exercising so that I don't injure myself.	1	2	3	4
I'm afraid that I might injure myself if I exercise.	1	2	3	4
I can't do all the things normal people do because it's too easy for me to get injured.	1	2	3	4
No one should have to exercise when she/he is in pain.	1	2	3	4

Woby, S.R., Roach, N.K., Urmston, M., & Watson, P. J. (2005). Psychometric properties of the TSK-11: a shortened version of the Tampa Scale for Kinesiophobia. *Pain, 117*, 137-44.

Appendix F: Unit Materials

Acceptance-Based Behavioral Therapy for Fibromyalgia

All the materials you will read have been developed by the researcher, Ms. Heather Simister, M.A., under the guidance of Dr. Gregg Tkachuk, PhD., C.Psych., and Dr. Matthew Bailly, PhD., C.Psych., unless otherwise noted.

Unit 1: Introduction & Acceptance

Fibromyalgia: Facts and Figures

Does this sound familiar? “Everybody has pain right? Just try to ignore it. Everyone gets tired. Just get going”. Or, “It hurts me to see you suffer so, I wish there was something I could do. Maybe you should take it easy today?” Well meaning people may sometime make these types of comments, but for those who have Fibromyalgia, it isn’t just as simple as ignoring, “just getting going”, or taking it easy. In fact, there is little that can be described as “easy” when you have Fibromyalgia Syndrome (FMS). Between 2- 10% of the population has fibromyalgia - that’s means you’re among the 60,000-3 million Canadians who have FMS. People of all ethnic groups, ages, and socio-economic strata are diagnosed with Fibromyalgia, although women are three times more likely to be diagnosed than men. Part of the reason for this difference may be that female bodies are physically different from males; women are more flexible, have different hormones and neurotransmitters, and have different sensitivities to certain chemicals that may make them more vulnerable to diseases of the musculoskeletal system.

Fibromyalgia comes from the separate words *Fibro*, meaning fibrous tissue, *myo*, referring to muscles, and *algia*, meaning pain. Literally speaking, Fibromyalgia means pain in muscles and fibrous tissue. And if you have the syndrome, you are all too aware of how accurate this description is. Systemic pain is required for diagnosis; however, pain is often not the only symptom associated with having fibromyalgia. The following table illustrates common symptoms experienced by people with FMS:

Category	Specific symptoms
Neurological	Muscle cramps, weakness, headaches, perceptual disturbances, sensory overload
Neurocognitive	Decreased concentration, short-term memory problems, difficulty multi-tasking, easy distractibility
Fatigue	Insufficient energy to complete general tasks of daily living
Sleep	Non-restorative sleep, insomnia, restless leg syndrome, sleep reversal
Autonomic/endocrine	Heart rate disturbances, low blood pressure (often when standing up suddenly), dizziness, dry eyes/mouth, temperature instability, hot/cold intolerance, intestinal & bladder difficulties
Stiffness	Morning stiffness, stiffness throughout the day following periods of inactivity
Gastrointestinal	Irritable Bowel Syndrome, bloating, diarrhea, constipation

This is not by any means an exhaustive list, but does highlight how varied the symptoms can be for those with FMS. Not only are the types of symptoms varied, but the pattern, frequency, and intensity of symptoms are also different across different people. Even within the same person, symptoms will often wax and wane over time. With so much variability, it's no wonder that this is a very difficult illness to diagnose and treat!

Question: Many different symptoms are associated with FMS. Did any of the above surprise you? Do you have any of the above symptoms that you may not have realized could be associated with your FMS?

While there currently is no consensus on the cause of FMS, some theories have suggested that certain people may have a genetic vulnerability to developing this or similar disorders. Trauma, such as an accident, childbirth, or a virus may trigger the first symptoms of FMS in some people, while for others, the symptoms may gradually appear, making a cause difficult to determine.

Living with Fibromyalgia

Often, it is the unpredictable nature of FMS that makes it so hard to live with. People rely on being able to make a number of predictions all of the time in order to live in our environments. We know we are supposed to be at work at a certain time, that if we say hello to a friend they will reply, that morning comes before night, and that if we take medication, we will feel better. But what happens when we can't predict what will happen from one moment to the next? Or when what we've been taught to be true (such as taking medication to feel better) no longer seems to be accurate? Living with Fibromyalgia means learning to live with unpredictability; and learning what you can change, and what you can't. In addition to coping with a number of ever changing symptoms, some people with Fibromyalgia need to become experts in using multiple treatments including medications, physiotherapy, exercise regimes, and psychological interventions. Others may have not even been offered such treatments or know how they could be helpful. The systemic nature of FMS also means that usually, people with FMS will have many different health care professionals involved. Keeping track of numerous appointments, and being able to use those appointments effectively requires a good deal of planning and good communication skills - two things that are going to be exceedingly difficult with symptoms such as reduced multi-tasking, short-term memory problems, and fatigue. These cognitive symptoms are often known as "Fibro Fog".

Question: Have you ever heard of Fibro Fog before? How do you experience Fibro Fog?

Usually, you try the best you can to manage your symptoms. As soon as you treat the pain, the fatigue takes over. On other days, you just can't focus very well on anything you need to do. Sometimes it even feels like you are backtracking a bit. But in order to get where you are going, this is sometimes necessary. To illustrate this common feeling, the following metaphor may be helpful:

Click on the audio clip titled “Path up the Mountain Metaphor”

Path up the Mountain Metaphor

Suppose you are taking a hike in the mountains. You know how mountain trails are constructed, especially if the slopes are steep. They wind back and forth; often they have “switchbacks,” which make you literally walk back and forth, and sometimes a trail will even drop back to below a level you had reached earlier. If I had asked you at a number of points on such a trail to evaluate how well you are accomplishing your goal of reaching the mountaintop, I would hear a different story every time. If you were in switchback mode, you would probably tell me that things weren’t going well, that you were never going to reach the top. If you were in a stretch of open territory where you could see the mountaintop and the path leading up to it, you would probably tell me things were going very well. Now imagine that we are across the valley with binoculars, looking at people hiking on this trail. If we were asked how they were doing, we would have a positive progress report every time. We would be able to see that the overall direction of the trail, not what it looks like at a given moment, is the key to progress. We would see that following this crazy, winding trail is exactly what leads to the top.

Question: What was your experience reading the Path up the Mountain metaphor?

The Problem with Avoidance

When you live in constant pain, it seems that trying to avoid any situation that could potentially increase pain or fatigue only makes good sense. In fact, some people have actually been told that they should rest and not engage in any strenuous activity until they are “healed”. Furthermore, some people find that even just thinking about such experiences arouses negative feelings and that these feelings should also be avoided. The problem with avoidance is that it usually leads to a downward spiral. When you worry about something, avoidance temporarily reduces its negative impact. However, a great deal of research has shown that such *experiential avoidance*, or unwillingness to remain in contact with a painful event, actually makes you more likely to avoid anything even remotely associated with that event. When you try to avoid pain, your sense of your body, sense of self, thoughts, and feelings, one of two things generally results. You are either much more likely to avoid the activities you truly value, or conversely, you develop a tendency to overdo your daily activities as a means of distracting yourself from the pain or proving to yourself and others that your life still has some meaning. Sometimes, both of these response tendencies occur within the same person at different times. In the first case, your life becomes increasingly restricted and constricted and you will also become quite physically deconditioned over time. In the second case, you will experience life as a fast paced treadmill in which it becomes increasingly difficult to keep up and will eventually crash in repeated “yo-yo” like fashion each time you wear yourself into total exhaustion. In either case, you don’t have an opportunity to truly experience an activity for its own sake, in order to learn and grow from the

experience. Consequently, you never seem to make any progress and in fact may feel as if things are getting worse all the time. There must be an alternative to this form of suffering.

Question: What is experiential avoidance? Why is experiential avoidance such a potential problem, especially for chronic pain conditions such as FMS? Can you think of a time when you might have engaged in experiential avoidance?

The Problem with Trying to Get Rid of Pain (and other unwanted experiences)

Most people believe that if they want to quit smoking, they first need to get rid of their nicotine craving. Or to lose weight, they need to stop craving food. Along those same lines, you may believe that you need to get rid of your pain before you can live a valued life with Fibromyalgia. But pain is normal and even functional. Pain is a universal experience. Everyone experiences physical and emotional pain at different times in their lives. While pain is not often seen as a positive experience, it is an important survival mechanism. Pain allows us to recognize when something poses danger to us, and can allow us to protect ourselves from further injury. A group of genetic disorders called Hereditary Sensory Autonomic Neuropathy causes people to feel little or no pain. To most, a pain-free existence sounds like a god-send, but for those who suffer from this group of disorders, life is full of limitations as they repeatedly check for injuries that anyone else would easily notice. The inability to feel pain often has a significant impact on their longevity and people with these disorders die from injuries or illnesses such as appendicitis or heat stroke where most of us would feel pain and be able to seek care long before these conditions prove fatal. So some pain is necessary, but suffering is not. The words pain and suffering are often used interchangeably but they are two distinct states. Pain is an unpleasant sensory and emotional experience. It is a reflexive sensation to tissue injury or irritation and can be very difficult if not impossible to control or avoid. Suffering on the other hand, is more related to how you think about and actually behave by either approaching, or avoiding, your situation. Sometimes this distinction can be made by talking about *clean pain* and *dirty pain*. *Clean pain* is the physical pain you feel, a simple, immediate, sensation that is the body's way of warning you something is wrong. *Dirty pain* is everything else; all the reactions you have, your judgements, and your efforts to relieve yourself of pain when relief may not be possible. It's the moments when you feel like you aren't moving up the mountain path because you are traveling down a switchback and can't see the larger picture. In other words, clean pain may always be a part of your life, and one that you cannot control. Dirty pain, on the other hand, *is* something you can work on changing.

Question: How is living with the pain and fatigue of FMS similar to someone who is trying to change a bad habit or addiction?

Question: What is the difference between clean pain and dirty pain?

The Current Program

Over time, you've probably tried many different approaches to get rid of or reduce your pain. What's different about this treatment approach is that it integrates education and acceptance of thoughts, feelings, and bodily states in order to help you live your life in a valued direction and with greater self-compassion. Throughout this treatment, we will take you through ten distinct units that are designed to address the different problems associated with having FMS by combining our knowledge in psychology, physiotherapy, and medicine.

This treatment is based on our understanding of how the human mind works. The human mind has allowed us to solve many of life's biggest problems. Sometimes, this skill can be very useful. On a personal level, the human mind is very good at coming up with reasons or explanations for our experiences, and then naturally evaluating or judging the outcome, or how well we think we are doing, accordingly. Unfortunately, our reasons often tend to be quite self-critical and we also establish dysfunctional rules such as "Because I have FMS, I no longer have a life" or "If I can just get rid of my pain, I can go back to living my life", that further constricts our options for valued living. Throughout this treatment, we will provide you with tools to shift from a judgmental and controlling stance towards a compassionate and accepting stance for your life and how you see yourself.

One important component of this treatment program is the cultivation of mindfulness. Mindfulness is century's old way of directing attention that originates in Eastern traditions. There are many different ways to practice mindfulness ranging from formal meditation practices to how we approach everyday activities. Mindfulness and acceptance often go hand-in-hand; you notice what is going on without trying to change it or push it away. Part of this treatment will show you how to develop a mindfulness-based approach to your FMS.

Incorporating Acceptance and Mindfulness means this treatment will take a bit of a different approach than you may be used to. Rather than focusing on how to reduce your pain, we will help you find ways to live in accordance with your values while still addressing the common problems associated with having FMS. This will shift the focus away from pain management, and back to building a valued life. In short, we plan to empower you to take back your life!

[Question: How is this program going to be a bit different than what you may have tried before?](#)

Your program will include information about FMS, common medications, exercise, and communication strategies. It may also include: how acceptance can help, using mindfulness, how to get some healthy distance from thoughts, developing a sense of self-compassion, and engaging in a valued life while compassionately making room for the symptoms of FMS. Your treatment will include 6 units (including this one) that will address the concepts listed above. Some parts of this program are similar to self-help materials in that the concepts will be presented to you in writing and you will be given certain questions to think about or activities to complete. These questions and activities are similar to what you would receive if you went in to see a therapist in

person, but with the benefit of not needing any specific appointment. You can access the materials whenever you would like; 24 hours a day, 7 days a week. You can always go back to previous materials, but just as if you went to see a therapist, future units will be locked until you complete previous units. This is to help you focus on important concepts that build on each other, and make sure you get enough experience with each piece of the treatment before moving on. Sometimes it can be so tempting to “jump ahead”, but to get the benefit of this treatment, you really need to experience the pieces of it, not just read about them. Many of the treatment components will be highlighted for you by using audio clips, questions, activities or assignments, and vignettes.

To help you see how the skills you are being taught can work in your everyday life, we would like to introduce you to four people who have been diagnosed with FMS. Some aspects of their stories may sound very familiar to you. Meet Jennifer, Elizabeth, Linda, and Robert. You can hear their stories in the audio clips accompanying this unit.

Your Experiences with Pain Management

Take some time to reflect on the different pain management strategies you have tried in the past. Have you heard of other management strategies that you haven't yet tried? Consider how effective different strategies are in terms of their short-term and long-term effects for pain relief. What ways do these strategies affect your quality of life? Have they helped you do the things you want to do or allowed you to live the way you want to live? Have there been any negative impacts that have kept you from meeting your goals?

In the table below, write down all the types of pain management strategies you've tried. Include anything you have tried and not just formal treatments. Have you been self-medicating with alcohol or other drugs? Have you spent days trying to distract yourself or trying to feel numb? If someone else has mentioned a different strategy that you haven't yet tried, but would like to, feel free to include it in your list below and guess what the impacts of that strategy may be. If you're having trouble, take a look at Linda's examples, which follows the table below. Reading what she wrote might help you come up with some additional strategies.

Type of pain treatment	Short-term effects on pain	Long-term effects on pain	Long-term effects on quality of life

Linda's experience with Pain management:

Type of pain treatment	Short-term effects on pain	Long-term effects on pain	Long-term effects on quality of life
Painkillers	Some relief	None	Reduced my ability to work & do things with my son. Couldn't drive
Surgery	Total relief for a short time	None	Great improvement for awhile, but then the real pain began
Physical Therapy	No real change.	None, but learned exercises that I could do	None. If anything, I was let down because I thought my pain would improve. Exercise made my fatigue worse
Watched TV for 3 days trying to forget the pain,	None, but didn't do anything that could cause pain	None	None, but I did feel stupid for wasting so much time. Son told me I was being lazy.
Taking over-the-counter medication to sleep	Some improvement in the short-term. Couldn't feel pain while asleep	None	Started waking up in the morning with a headache. Had more trouble sleeping if I didn't take the meds. Couldn't get out of the house or talk to anyone because I was so out of it.

Acceptance

What is acceptance? Acceptance is a word commonly used to describe the act of tolerating or resigning yourself to something. One such example is, "I can't do the things I used to because I have Fibromyalgia, so I guess I'm just going to have to accept it." This meaning of acceptance has a negative connotation for most FMS patients we have worked with. What's more, even if this passive approach is taken, it tends to lead you nowhere – a dead end - even though you still have the rest of your life to live. That is not what we mean by the word acceptance. The word acceptance actually comes from the Latin word meaning "to take what is offered". When talking about acceptance, we may use the word "willingness" somewhat interchangeably. Willingness means "to choose something openly". Therefore, willingness and acceptance aren't very good words for describing the act of resignation, just the opposite!

Question: Acceptance is often confused with resignation. For our purposes, how are they different?

You've probably had the experience where you were scared something bad might happen (such as if you were walking alone at night) and you can feel your whole body tense up; the fight



or flight response. Anticipation of things that may occur in the future, especially if those things are unpleasant, can cause us to avoid negative experiences before they ever happen. The trouble with avoidance is that the more you avoid something, the more your anxiety about that thing tends to go up, resulting in stronger avoidance of that same thing.

The human mind through its unique logic and use of language, traps us into believing that we can solve any internal suffering we may experience using the same methods we use to solve problems outside our bodies. This was described earlier as the trap of experiential avoidance. Its logical assumption is that there is a rational explanation for every human problem and that once this explanation is found, it will provide the solution. If an explanation can't be found, it just means that we haven't tried hard enough, or we haven't found the right expert. Carrying this logic forward, it stands to reason that we do what needs to be done. Either we must try harder to get well by walling ourselves off from even more of our inner experiences. Or, perhaps we should continue to search for the right expert or treatment that will end our suffering. And so the negative spiral continues. If this logical approach truly provided the solution, wouldn't you be feeling a lot better by now?

Question: How has logic “failed” you in your attempts to cope with the symptoms of FMS?

The painful fact of the matter is that life is not always fair and our mind does not provide all of the answers. If you can at all relate to the approach described above, the important question becomes, has your suffering tended to increase or decrease over time? If it has increased, chances are that you, like most of us at one time or another, have been a tricked by the mind's rigged game of experiential avoidance. How do we refrain from playing this game and get back to living? The only choice we can recommend is to make a conscious decision to fully embrace life by bringing all of our internal experiences, especially the negative ones, along for the ride.

Understanding avoidance helps us understand why the more you don't want a certain thought or experience, the more you are likely to have it. In other words, the more you aren't willing to have a thought or experience, the more you *will* have it. The more you struggle, the more you get caught. It's like the Chinese finger trap. This ingenious little toy is an excellent example of how struggling against something can get you stuck even more than before. Once you put your fingers in each end of this toy, your mind will inevitably tell you to start pulling your fingers in opposite directions in order to release them. Trouble is the toy is woven in such a way that the more you pull, the tighter the toy clings to your fingers. If you continue to pull, you will eventually cut off the circulation and lose feeling in your fingers. Is there anything else you can do? While you may not be able to get out of the trap right away, you can push your fingers further into the trap in order to loosen it enough to get some wiggle room and literally get the blood flowing again. Then you can consider some other options. This toy is a good metaphor for illustrating how to approach many difficult life experiences. Being in the trap is just like having Fibromyalgia; there is no cure, no getting out of it. The only thing you can influence is whether or not you create more of what's already there or turn your attention toward valued living.



Listen to Robert's struggles in the audioclips accompanying this unit.

Question: What happens when you try to pull your fingers out of the finger trap? How is this like dealing with a condition that includes chronic pain and fatigue? What is the solution to getting out of the finger trap? How could this solution apply to your experience with FMS?

Here's another example of how listening to what your mind tells you can create further suffering. Imagine that you have fallen in a big pit of quicksand. You quickly realize that you're stuck in it, and your mind tells you that you need to get out before you sink below the surface. What is the first thing your mind tells you to do in this situation? First, it tells you to take one foot out of the quicksand, but instead, you start to sink even further. This is because the speed at which you sink depends on the weight of the object (you) and the distribution of that weight in the pit. When you only distribute your weight over a small section like one leg or foot, you sink faster. Is there anything else you can do? The key to surviving the quicksand is to distribute your weight as evenly as possible over as much of the surface area as you can so as to *increase* your body's contact with the quicksand. This act of letting go of the struggle and giving yourself over to the quicksand will allow you to potentially roll off or at the very least buy you some time until someone else comes along and helps you to get out.

The goal in responding to your thoughts and feelings with acceptance isn't to feel better; in fact, you may even feel worse at first. Acceptance is about opening yourself up to the vitality of the moment, whatever that may be, and by doing so, you will be able to move towards a life you value. Instead of trying to feel "*better*", acceptance involves learning how to "*feel*" better. To be accepting and willing means to allow yourself to feel your feelings, think your thoughts, remember your memories, sense your bodily sensations, and adopt a gentle, loving stance toward yourself in order to simply be more aware of your own experience. You may want to listen to Liz's experience in the audioclips accompanying this unit.

Suppose in order to live a life of vitality that is meaningful and satisfying, you need to give up trying to control your thoughts and feelings for you can move in a direction of regaining your life? How willing are you to take this leap, knowing that it would mean having to do something completely different? While doing what we are suggesting doesn't require a lot of effort, it is risky because it means experiencing things you may have been trying to avoid, so you will need to be willing to take a bit of a leap of faith.

Imagine a bottomless pit, with you on one side and a monster we will call Fibro on the other. You are both engaged in a tug-of-war. You pull and pull and pull to avoid being pulled into the pit, but so does Fibro. Sometimes you get the monster a bit closer to the edge, and then,

Fibro pulls back even harder and suddenly you are closer to the edge again. You can't seem to win. But you have invested so much in pulling, and have been pulling for so long, there doesn't seem to be any other way. But what if you step outside of this endless battle for just a moment and consider if there is there another way? What else can you do? Most people, if they take a moment, realize that the only other real choice is to simply drop the rope. Dropping the rope allows you to let go of all of the negative thoughts and feelings you associate with Fibromyalgia (i.e., your dirty pain). Dropping the rope can even open your awareness up to other possibilities such as learning to listen to Fibro, negotiating with it, and perhaps eventually embracing or befriending it. Sure, Fibro hasn't gone away- it's still there- but you can now do a whole lot more, even if that monster stays with you in one form or another.

Question: We've presented a number of metaphors. Was there one or two that really struck you? Which one(s) and why?

How do you cope?

Ask yourself about your own experience and the ways you cope. If you're like most people, you will probably realize that you have tried to control your symptoms. How successful has this strategy been for you? In many other areas of your life, having control has probably been very useful. You are primed to believe that controlling your symptoms will get you back to the life you desire, but in this case, the more you try to control your symptoms, the more you lose the vitality of your life. Question: How does your Fibro Monster impact your life? Thoughts? Activity Restrictions? Self-medication? Avoidance?

So how do we know this will work? There is scientific evidence that using acceptance in this way can improve quality of life. Forms of acceptance therapy have been used to help people with chronic pain, migraines, diabetes, depression, and anxiety. In fact, the degree of disability is a poor predictor of outcome; instead, the best predictor of success is a person's acceptance of their condition and willingness to take responsibility for their life by engaging with the vitality of their life despite being in pain.

OK, so now that you understand why we are suggesting acceptance, you may be wondering how you are supposed incorporate this new way of thinking into your life. First off, you need to determine what experiences (thoughts, feelings, memories, sensations) you are unwilling to have. What patterns of avoidance do you currently have in place? And can you make room to look at those experiences from a non-judgemental stance? Learning to notice your thoughts, feelings, and sensations without judging them is an important first step. This skill is often known as *mindfulness*, and helping you develop it will be the focus of several of the following units.

Mindfulness is an important concept for this treatment. You'll learn more about it in Unit 6, but in the mean time, you can start practicing now with a simple exercise. Click on the audio clip titled: "Mindful breathing exercise". The exercise takes less than 5 minutes to complete. Practice this breathing exercise as often as you can; daily, if possible.

What is Clean and Dirty Pain?

Clean Pain:

- IS: Sensations triggered by our bodies to show an immediate threat to safety or injury (i.e., this is the pain sensations you experience even on your best day)
- IS NOT: any thoughts or feelings we have about what the sensation *means*

Dirty Pain:

- IS: all the reactions you have to your physical pain (including thoughts, feelings, behavioural reactions/avoidance)

CAN RESULT IN: suffering, restricting your life, feeling hopeless

For example, if you stub your toe, that first, physical sensation of sharpness in your toe is clean pain. Everything that comes with or after that sensation (random thoughts of how messy your home is, frustration that someone left the item out, a few “choice words” that you may say out loud or in your head, fear that this may trigger a prolonged pain episode) are all dirty pain. [Think about how much dirty pain is going on here as compared with the clean pain.](#)

Clean and Dirty Pain Diary

Over the coming week, use the following diary to track how the clean, purely physical pain functions and how the dirty pain functions. Make an entry on the form any time you experience pain. Record all sections of the table: the situation you were in when you first noticed the pain, describe the physical pain sensation (clean pain) and rate it on a scale of 0-10. Then describe your reactions to the pain experience (your dirty pain) and rate your level of suffering because of the dirty pain on a scale of 0-10.

Here’s an example of Jennifer’s pain diary:

Situation	Clean Pain		Dirty Pain	
	Pain description	Level	Pain description	Level
Tried to lift my toddler	Sharp pain in my back	7	Started thinking about how I was failing as a Mom	10
Husband came home and complained about the mess	fatigue	1	Was hurt because he doesn’t understand how much I have to do with 3 kids while still being so tired	8
Wanted to go out walking with friends, but was very sore & tired	General fatigue, general ache	4	Missed the walk, no time with friends. Popped a pill so I could watch tv alone. I hate it because I never used to take pills.	8

Now you try. Remember to keep your clean pain and dirty pain separate. Be honest!

	Clean Pain		Dirty Pain	
Situation	Pain description	Level	Pain description	Level

Unit 2: Values

Imagine you are driving a bus. Your passengers are all of the different parts of you: your interests, personality, desires, pain, distress, roles, etc. Each of your passengers is yelling out a different direction that you should be driving. It's the worse case of backseat driving you have ever seen! You could try to follow what each of those passengers are saying, but you'd always be driving in different directions, changing paths and never really knowing which way to go. You need something to show you which direction to drive. You need a compass. Values can serve as that compass and help you decide which way you want to drive. So what do we mean by values? Values are what you want your life to be about.

What values are not

Values are not goals. Values and goals are often confused. However, there are some important ways that they differ. Values can be thought of as the distinct ways in which you engage and participate in your life. Values are the process or direction by which you live your life (e.g., caring about your physical health and well-being), whereas goals are end points or outcomes in themselves (e.g, losing 10 pounds). Values can never be absolutely attained or completed. Goals are quite specific and future-focused; they state where you want to be as opposed to where you currently are. While specific goals can be very helpful and even motivational, they can cause distress when you aren't able to meet your goals. Working towards a goal can actually promote non acceptance of the present moment, because of the inherent dissatisfaction you feel over not yet reaching your goal. While goals can be stepping stones that lead you down the path of your valued life, your values help you determine which path to take.

Values are not feelings. Suppose someone is a drug addict. They feel good when they are high, but this feeling probably isn't a valued outcome. The addict may want to be closer to people in their life, and they see that their drug addiction is moving them away from that value. If the addict stops using drugs to be closer to the people they care about, they will be moving in the direction of their valued life, but it will be some time before they feel good (as their body detoxes from the drug). While your experience is different than that of a drug addict, this example reveals an important point: that moving in the direction of your valued life doesn't always "feel good", especially at first. But it's important to remember that values are not feelings.

Question: What are the differences between values and goals? Between values and feelings?

Attending Your Own Funeral

Have you ever attended a funeral and listened to a eulogy? Think about someone who is no longer alive but whose life you really admire. If you think about that person, you may notice that it is what they stood for that matters most, rather than their material possessions or personal foibles. Imagine that after living a normal lifespan, you have died and by some miraculous twist of fate you're able to attend your own funeral in spirit form. Try to imagine that your family, friends, co-workers, and any others who have known you are gathering to remember you.

Imagine seeing any person that you have known during your lifetime coming to pay their respects, even if they themselves have already died. People will speak about you at this service. You will be able to see and hear everything. Think of some specific people who would speak. What do you think these people would say about you? What would you like these people to say about you? What qualities do you want to be known for? What is it that people admire about you? What do you represent to the people speaking at your service? [Take some time to write down what you imagine people would say, or what you would like them to say. Please remember that this is not an exercise in actually “facing your death”, but in “facing your life”.](#)

Chances are, how you want to be seen isn't focused on your struggle with Fibromyalgia. Sure, your speakers may have talked about perseverance, but there's a lot more to you than Fibromyalgia. And even if you have included something about your struggle here, you've probably also included a whole bunch of other things, too. That's because you don't want your life to only be about your struggle, you want a life full of other things. This chapter will help you focus on what you want your life to be.

[Discovering your valued life](#)

Below are ten different areas that are a part of most peoples' lives. For each section, write in what you think is important to you. Remember, that these are values, not goals or feelings. If you're having trouble, listen to what Elizabeth wrote in the audioclips accompanying this unit.

1. Marriage/couple/intimate relationship: This is your relationship with your significant other. If you are not in relationship now, you can answer in terms of what you aspire to in an intimate relationship. What kind of person do you want to be in this context? What are the qualities you would like to have to be an ideal partner. Don't put specific goals as "get married", but rather what does it mean to you to be a spouse.

2. Parenting: What does it mean to be a mother or father? What would you like to be in this role? How can you support this role in others? Relationship with children? If you don't have children, you can write about how you would like to be as a parent.

3. Family relations. This includes other areas of family life apart from partner and children. What does it mean to be son, daughter, cousin, aunt, uncle, grandparent, in-law? What would you like to be about in your family?

4. Friendship/social relations. What kind of friend would you like to be? Think about closest friends and what you would like to have manifest in your life with regards to friends. What qualities do you bring to the relationship?

5. Work/career. Again don't write specific goals (I want to be a teacher), but what are the qualities of a valued job or career? What special skills do you want to bring to the labour force? What do you want to stand for in your work? What kind of difference do you want to make?

6. Personal growth: This section includes formal education, learning, or creative endeavors, arts, or anything that allows you to more deeply explore and develop who you are. What type of learner do you want to be and how would you like to engage in that area of your life?

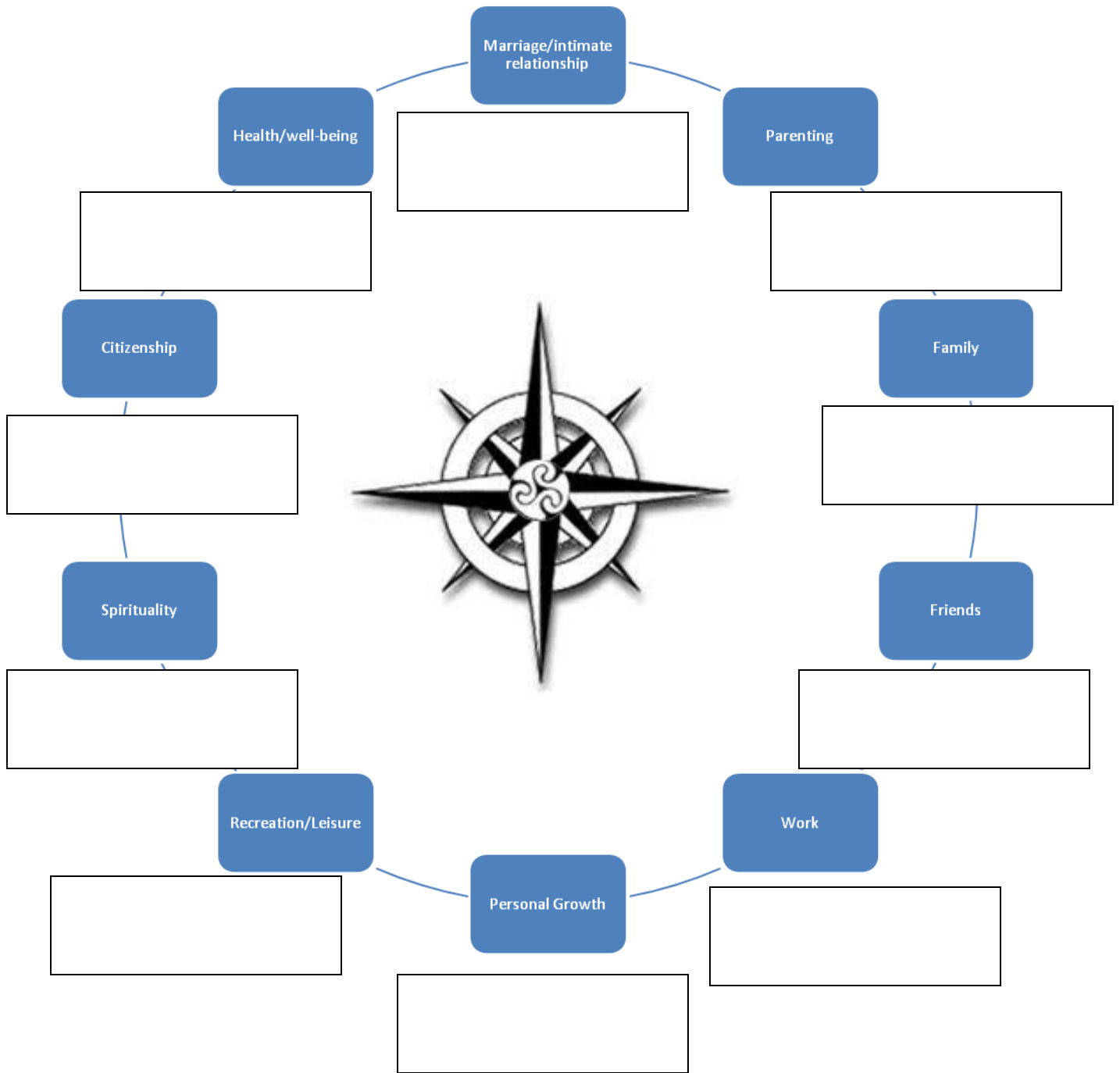
7. Recreation/leisure. Recreation, leisure, & relaxation are an important part of life. They offer us a chance to recharge. What activities, interests, and hobbies do you like to cultivate? What would you like included in your life?

8. Spirituality: When we say spirituality, we do not necessarily mean organized religion, but it could be included here. Spirituality is everything that makes you feel connected to something larger than yourself. Think about it in broad terms; whatever that means to you. Describe the role of spirituality in your life and how it would manifest.

9. Citizenship: How do you want to contribute to society and be a member of the community? What does being a citizen mean to you?

10. Health/physical well-being. We are all physical beings and need to take care of our bodies. What roles do exercise and nutrition play for you? List here how you'd like to care for your body under ideal circumstances.

Once you have come up with your values, you may want to put them on the compass, below. Remember that the compass doesn't tell you how to get somewhere, it just provides guidance on which directions to take.



Now that you have written your statements, go back and take a look at them again. In the left hand margin, rate how important these values are to you on a scale of 1-10, with 1 being not important at all and 10 being extremely important. You don't need to rank order your values. In other words, you may have three values you rate a 6. Just read each on separately and rate its level of importance to you.

Have you rated your values? Go ahead, finish rating them before we continue. OK? Now I want you to go back to your ten different values list again. This time, use the right hand column and rate how consistently you feel you have lived in accordance with those values within the last few weeks. Use a scale of 1-10, with 1 meaning “not at all” and 10 meaning “completely”. You may be surprised and even a bit discouraged when you see the lack of engagement in the things that you value. The great news is that values are something that you can choose to include in your life.

During the next week, watch how you live your life. The following table will help you think about the actions you took and how consistent those actions are with you values. Also think about the things that you missed that would be consistent with your values.

For each day in the next week, briefly describe an action that is consistent with one of your values. Mark a T for Taken or M for missed. On a scale from 0-100, rate how mindful you were during the action or missed opportunity. Note any obstacles that stopped you from taking action (or could have). There is no right or wrong answer to this assignment. We all choose not to engage in valued actions for a variety of reasons. This is just a way for you to start getting a better sense of what may be getting in your way so that you can make choices as to how you would like to proceed. Elizabeth has started completing the table to help give you some examples.

Date	Action	Taken (T) or Missed (M)	Mindfulness (0-100)	Obstacles
1/12	Spend time with kids	Taken	10	I was distracted thinking about a problem at work
1/13	Dinner with Joe	Missed	10	I was really tired after a long day so I didn't want to go out
1/14	Spent time talking with Joe	Taken	90	
1/15	Out for drinks with coworkers	Taken	5	I was worried they would think I was lazy because I can't work anymore. I was worried I wouldn't be able to sit for long enough to enjoy a night out.

Now you try. Watch for activities that show your values to pop up in your week. Set aside some time everyday to think about some examples you encounter and complete the table on the following page. Don't be afraid to include examples of activities you had planned or could have participated in and missed. This exercise is designed to help you become more aware of different values within your life and how well you are living your values *right now*. Most people are surprised at the number of missed opportunities that happen as they try to live their lives the way they think they need to. Feel free to copy the table if you need more space.

Unit 3: Information on Medications, Sleep, “Fibro Fog”, Exercise, and Effective Communication

In this unit, we will be covering information on a number of separate, but very important areas: medication, sleep, the cognitive aspects of fibromyalgia (also known as “Fibro Fog”), exercise, and Communication. It may seem like a lot of information, and it is, so try reading a little at a time, or just reading the parts that address your concerns. There are no additional exercises in this unit as there are in other units, just information you may find useful.

Medication

Note: This unit’s section on medications were written under consultation with Dr. Ryan Skrabek, M.D.



In order to evaluate the effectiveness of the current treatment, it is important that you do not change your medication until after finishing with this treatment program. While it probably seems like a good idea to try anything else that may help you, trying too many things at once makes it difficult or impossible for you and your treatment team to know what is helping and what isn’t.

The following is a chart of common medications people are prescribed for treating various aspects of their fibromyalgia. There may be other medications that your doctor has prescribed that are not on the list.

REMEMBER: Always talk to your doctor and/or pharmacist before changing any of your medications or dosages. Do not take medication prescribed for other people, even if they have the same symptoms as you. And remember: vitamins, herbs, and supplements are drugs too. Make sure you tell your doctor or pharmacist about *everything* you are taking so that they can provide you with the best advice specifically for your own needs.

Medication Class	Generic (Trade) Names	Dose	Indication	Side Effects
Tricyclic Antidepressants	Amitriptyline (Elavil)	10-150 mg at bedtime	Restores sleep, mild pain relief	Drowsiness, dizziness, dry mouth, constipation, weight gain
	Nortriptyline (Pamelor)	10-150 mg at bedtime		
	Desipramine (Norpramin)	10-150mg at bedtime		
	Sertraline (Zoloft)	50-200 mg once a day		

Medication Class	Generic (Trade) Names	Dose	Indication	Side Effects
Selective Serotonin Reuptake Inhibitors	Paroxetine (Paxil)	20-50 mg once a day	Depression, mild pain relief, sleep aid	Drowsiness, dizziness, dry mouth, constipation, nausea, increased risk of suicidality
	Sertraline (Zoloft)	50-200 mg once a day		
Serotonin and Norepinephrine Reuptake Inhibitors	Duloxetine (Cymbalta)*	30-60 mg once a day	Depression, mild pain relief, sleep aid	Drowsiness, dizziness, dry mouth, constipation, nausea, increased risk of suicidality
	Milnacipran (Savella)*	12.5-50 mg twice a day		
	Venlafaxine (Effexor)	37.5-150 mg once a day		
Opioids	Tramadol & Acetaminophen (Tramacet)	37.5/325 mg 1-2 tabs QID	Short acting pain relief	Drowsiness, dizziness, constipation, dry mouth, nausea, itching
	Tramadol (Tridural)	100-300 mg once a day	Long acting pain relief	
	Tramadol (Ralivia)	100-300 mg once a day		
Antiepileptics	Pregabalin (Lyrica)*	50-450 mg/day divided BID	Pain relief and mild sleep aid	Drowsiness, dizziness, swelling in legs/arms, weight gain, dry mouth
	Gabapentin (Neurontin)	100-3600 mg/day Divided TID		
Cannabinoids	Nabilone (Cesamet)	0.5-2 mg twice a day	Pain relief and mild sleep aid	Drowsiness, dizziness, dry mouth, concentration disturbance
	Dronabinol (Marinol)	2.5-10 mg twice a day		
	delta-9-tetrahydrocannabinol & cannabidiol Sativex	27/25 mg/ml 1-2 sprays SL as needed		

Medication Class	Generic (Trade) Names	Dose	Indication	Side Effects
COX-II Inhibitors	Celecoxib (Celebrex)	100 mg twice a day	Pain relief	Upset stomach, abdominal pain, diarrhea, internal bleeding, heart attack, stroke
Muscle relaxants	Baclofen (Lioresal)	5-80 mg/day divided TID-QID	Pain relief, muscle spasm	Drowsiness, dizziness, weakness, fatigue
	(Cyclobenzaprine) Flexeril	5-10 mg TID	Pain relief, muscle spasm	Drowsiness, dry mouth, fatigue
	Tizanidine (Zanaflex)	2-8 mg TID	Pain relief, muscle spasm	Drowsiness, dizziness, fatigue, low blood pressure
	Methocarbamol & Acetaminophen (Robaxacet)	400/325 mg 1-2 tabs QID	Pain relief, muscle spasm	Drowsiness, dizziness, nausea, low blood pressure
Sleep Aids	Trazadone (Oleptro)	50-100 mg BID or TID	Depression, sleep aid	Drowsiness, dizziness, nausea, fatigue
	Zopiclone (Imovane)	5-15 mg at bedtime	Sleep aid	Drowsiness, dizziness, nausea, dry mouth
Dopamine Agonists	Pramipexole (Mirapex)	0.5-1.5 mg TID	Pain relief, muscle spasm, restless legs	Drowsiness, dizziness, low blood pressure, involuntary muscle movement, dry mouth

Duloxetine (Cymbalta)*, Milnacipran (Savella)*, Pregabalin (Lyrica)* are all FDA approved in the United States for the treatment of fibromyalgia

Question: Medication can be one tool in your toolbox of strategies for coping with your FMS symptoms. What have some of your experiences been with medication? Has it helped? Are there any drawbacks to the medications you take or have previously taken?

SLEEP

Ah, sleep; the ever elusive mission. Most people with Fibromyalgia report some type of sleep-related difficulty, including non-restorative sleep, restlessness, trouble falling or staying asleep, and cycle reversal (sleeping during the day instead of at night). While there are some medications that can help you sleep, there are also a number of things you can do to help improve your sleep quality and quantity.

1. Be informed about common sleep myths. Most people think that if they can't sleep for 8 hours straight they have insomnia. Or that if it takes more than a few minutes to fall asleep something is wrong. The truth is, "normal" sleep is anything between 4-9 hours per night. And falling asleep as soon as your head hits the pillow is more of an indicator that you are overtired than a reasonable expectation for falling asleep.
2. If possible, invest in a good bed and pillows. That 20 year old mattress probably isn't doing its job supporting you. Often, a newer mattress with proper support can go a long way to improving your sleep. And if you struggle with pain at night, investing in a few good longer pillows can be helpful as you can use them to prop up and support your body while you sleep. Also, consider your sleep environment. Most people sleep better in a quiet, dark, cooler environment.
3. Stick to a set wake-up time regardless of when you get to sleep. While it may seem like you just need to get the sleep in whenever you can, your body's internal clock is set more by the time you wake up than by the time you go to sleep, the light outside, or the activity you had throughout the day. Keeping a set wake-up time will help your body know when it is time to sleep, and when it is time to be awake. Use an alarm clock to make sure that you accomplish this consistent wake-up time. Try to maintain the same routine on weekends as you do during the week.
4. Avoid caffeine, nicotine, alcohol, and heavy meals for several hours before bedtime. Caffeine is a powerful and long-lasting stimulant that interferes with natural sleep cycles. Nicotine is also a powerful stimulant. Alcohol may make you sleepy but it leads to restless, nonrestorative sleep and contributes to the tendency to wake up during the night. If you are used to it, having a light carbohydrate snack before bedtime will not interfere with sleep to any great extent.
5. If you have to nap, keep it short. Napping also can throw your internal body clock off. Generally, it is recommended that teens and adults should avoid daytime napping whenever possible. If you really can't make it through the day without a nap, keep it to a maximum of 30 minutes. This time limit keeps you from going into the deeper stages of sleep which will actually help you be less groggy after a nap. Also, avoid napping in the

later afternoon and evening. The closer you nap to your planned bedtime, the harder it will be to fall asleep.

6. Restrict your activities in bed. When people have trouble falling or staying asleep, we often recommend that you limit what you do in bed to sleep and sex. This means no TV, reading, talking on the phone, etc. in bed. Why? Because we want to teach our bodies that “bed” means “sleep” and the stronger this relation, the quicker and easier it will be for you to fall asleep.
7. Don’t stay in bed worrying about not sleeping. It happens to all of us. If you can’t fall asleep after 20 - 30 minutes, it may be better to get up and do something relaxing and return to bed once you are sleepy.
8. Have a set bedtime routine. When settling children to sleep, people are very familiar with the importance of a bedtime routine. We tend to forget about this routine as we get older and have more things to do. Try bringing the routine back. Have a set of things you do before going to bed such as changing into pajamas, brushing teeth, listening to calming music, have a small snack. You can’t run in from a bunch of errands and expect yourself to fall right asleep! You can help your body know it’s bedtime by sending it signals that it is time to sleep. Avoid exercising or doing work within the last hour before you go to bed. Reading and watching TV can sometimes be good settling activities, but make sure that they aren’t things that get your mind going or get you really worked up (certain TV shows or books can do that to some people).

Question: What have you learned about sleep from this unit? Are there ways you can think of to help your own sleep based on what you’ve seen here?

Linda’s story: I try to go to sleep, but most nights I just lay there and stare up at the ceiling. I end up just watching the time on my alarm clock ticking away. I start counting down to the time I need to wake up. “Ok, if I fall asleep now, I can get 6 hours of sleep. Ok, now I’ll get 5 hours of sleep. If I can just fall asleep, I could possibly get 3.5 hours of sleep tonight.” My therapist talked about getting out of bed instead of just laying there, but I really didn’t want to. I didn’t want to lose any more sleep, or risk that I wouldn’t be able to find a comfortable position again. But after my therapist pointed out that I wasn’t really getting any sleep anyway, I decided to give getting up a try. At first, I did get less sleep than before, but within a couple of weeks, I was actually getting better sleeps AND I could fall asleep much easier than ever before. I think letting go of that sense of panic that I wouldn’t get enough sleep helped me settle in so much quicker than trying to fight it.

COGNITIVE SYMPTOMS

While we still don't have a great grasp on how Fibromyalgia affects the brain, there is growing evidence for what many have termed "Fibro Fog". Difficulties with concentrating, forgetfulness, word finding, short-term memory, and poor planning abilities are common cognitive problems associated with fibromyalgia. Part of the difficulty with really understanding these symptoms is that they are also common in people that have sleep troubles, anxiety disorders or depression; all of which occur frequently in people with fibromyalgia. The good news is that we don't have to know exactly why these symptoms occur in order to work with them.

You may want to listen to Liz's experience with Fibro Fog in the audioclips accompanying this unit. Like Liz, you may have found some ways to help jog your memory. Here are a few tips:

1. Write it down. Liz used sticky notes to help her keep track of her busy schedule. Visual aids are a great way to get around both the planning and memory deficits that sometime accompany fibromyalgia. Write notes, have a calendar that you can check daily, or put reminders into your agenda or phone.
2. Keep a schedule. Doing the same thing at the same time on the same day may seem boring, but a set schedule can really help you live your life. You don't have to think as much if you know that your appointments are always on Tuesdays. Or that Wednesday is Girl's night out. The reality is most of us have a schedule anyway; we just don't think of it. It's because we are all so used to following schedules that we feel out of sorts going back to work after a long weekend, or after day light savings time takes effect.
3. Do one thing at a time. Seems obvious to say that if you are having trouble multi-tasking, just do one thing at a time. Easier said than done. Our world today seems to be focused on getting as much done as possible every second of every day. But how is that idea helping you live your valued life? Chances are it isn't. Rather than fighting through doing many things at once when you already having difficulty keeping your mind on track, try just doing one thing at a time. (Hint: This is a great chance to practice your mindfulness!) You may even find that you are able to get more things done instead of less.
4. Allow yourself extra time. Aside from being tired all of the time, you may also find that it's hard for you to take in information, especially when it's coming at you at warp speed. Slow down when you can. Give yourself a little extra time when you know you need to learn something or when you are trying to find the new doctor's office. Allow yourself the chance to read your child's permission slip over a couple of times before signing it.

Question: What are some tips and tricks you have for coping with memory problems and your “fog”?

COMMUNICATION: HOW TO TALK SO PEOPLE WILL LISTEN

Many people, even people who don't have a chronic illness, feel like they really can't express their needs or stand up for themselves when necessary. This may be especially true if you feel guilty that you aren't contributing in the way you (or others) think you should. You may end up saying “yes” when what you really want to say is “no”. At other times, you may end up “blowing your top” out of frustration because people are not hearing what you really need to say. This section will help you learn how to express yourself in a way that others can hear you. It takes courage not to cave in, but standing up for what you need while still listening to the other person actually improves relationships.

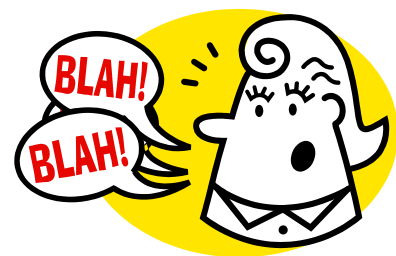
1. **Be clear about what you really want to say.** Express yourself clearly and make your position clear. This may mean taking a few seconds to make sure you are clear about what you want. Think about what you want from the other person. Is it information, help on a specific task, advice, understanding, reassurance? You can't expect the other person to be able to give you what you want if you aren't even sure yourself. Once you figure out what you are looking for (it may be more than one of the above), state it clearly to the other person; don't expect that they can mind-read or *should* know how you feel or what you would like from them (even if you asked the same thing last week!).

Question: Give an example of an unclear statement or request (e.g. I'm just so sore!). Then come up with one or two other statements that would help clarify what you are looking for the other person to hear (e.g. “I could really use some help with the laundry today” or “I'm really frustrated that this pain gets in my way and I can't get stuff done. It seems like you get frustrated with it, too.”)

2. **Be assertive.** Most people make three key mistakes when trying to be assertive. First, they may not feel entitled to ask. Second, they don't know why they are feeling the way that they do (see point 1 about being clear). And third, they confuse being assertive with being either passive or aggressive. Being assertive means being in between these two extremes. If you want to reduce your pain and are at the doctor's office, you could take any of the three approaches. A passive approach such as “you're the doctor, whatever you say”, an aggressive approach “You don't understand anything!” or, more effectively, an assertive approach “I know you are offering me some ideas, but I've already tried those and they don't seem to work. I'm really frustrated with this constant pain. Is there anything else you can offer?” This last approach is more effective, because you state specifically what you are looking for, you are clear about your feelings, and your tone is less likely to make the doctor feel like they are being attacked.

Click on the audio clip titled “being assertive versus being aggressive or passive”

Question: Give an example where you were assertive instead of being aggressive or passive.



Question: Practice being assertive. A great opportunity to practice this is when you get a sales call or a call from someone you don't know.

3. Learn to use active listening. Really listening to other people, even if you don't feel that you are getting the same in return, is a great way to improve communication and ultimately, get your needs met. Active listening is a way for you to get across to the other person that you really hear what they are saying to you. This isn't the same as parroting back what they say, but instead saying back what the other person *meant* to say. Doing so lets the other person know that you are really listening to them, and that you care about what they are trying to get across. It also buys you some time to hear a bit more if you don't really know what's going on. For example, let's say your partner comes home and starts yelling "This place is a pigsty! What do you do all day?" The natural reaction would be to make some snide remark right back, but usually, this kind of communication ends up with nobody winning. Instead, using active listening, you might say something like "You seem to feel like I don't pull my weight around here, especially because I don't work outside of the home." This gives your partner a chance to say more, and shows that you really hear what they said and value what they feel. They'll probably calm down much more quickly, and be more willing to hear about how part of your job right now is working on getting better. This may also open up some opportunity for shared problem-solving, where you'll have a chance to use your assertiveness skills.
4. Write it down. This last point is especially important when you have limited time, such as in doctor's appointments and to help address some of the cognitive symptoms associated with FMS. Write questions you have down, with the most important ones first. Think about some of the questions your doctor may have and be prepared with answers. Write down your symptoms, including information such as the length, intensity, severity of the symptoms, when they started, and what triggers the symptoms. If it is a chronic concern, be prepared to include what is different now than in previous appointments. You may even consider doing a daily symptom diary for the week prior to your appointment to have really clear, tangible examples.
5. Learn effective problem solving. There are 6 steps to effective problem solving:
 - a. *Identify the problem.* This means having a very clear idea about what you are trying to solve.
 - b. *Goal selection.* Decide what parts of the problem you are working on.
 - c. *Generation of alternatives.* Come up with specific ideas of some solutions to the problem. At this point, don't get caught up with which one is best, just try to come up with solutions.
 - d. *Decision making.* This is where you decide on a course of action. There may need to be some discussion and give-and-take if other people are involved. Use your

communication skills to come to a solution that works for you, as well as the other people.

- e. *Implementation.* Try out your solution
- f. *Evaluation.* Many people forget this all important last step. You should always evaluate if your decided solution is working the way you thought it should. If other people aren't completely happy with your decision, it can help tell them about how you will evaluate the solution. If your solution isn't working, go back and try another one.

Question: Give an example of a problem and how you used all 6 steps to solve it.

EXERCISE AND PACING

Note: This unit's section on exercise and pacing was written in consultation with physiotherapist Dr. Barbara Shay, PhD.



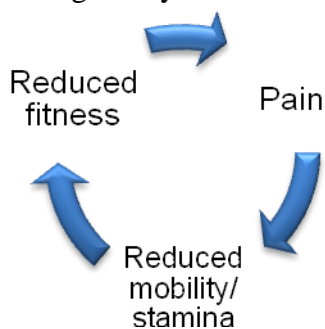
It is always a good idea to talk to your doctor or another professional (e.g. physiotherapist) prior to starting new exercises. That being said, there are probably a number of exercises you already do that can be safely incorporated.

Usually, our bodies are designed to send us clear signals that what we are doing is harmful. We feel pain. Acute pain, or pain that lasts 24 hours to 10 days, generally results from some type of physical injury to our bodies. It is our body's way of telling us to slow down and take care to keep from further harm. The trouble starts when someone's pain changes from being acute to chronic. Pain that has persisted anywhere from 3 to 6 months or longer is called chronic pain. Chronic pain causes a lot of problems because aside from the frustration of painful sensations, our body signals are no longer as reliable as they should be.

Question: How is chronic pain different than acute pain? Do you think your FMS is more similar to chronic pain, acute pain, or a mix of both? What about other FMS symptoms? Can they be differentiated as chronic versus acute?

Symptoms of Fibromyalgia Syndrome (FMS) including widespread and localized pain, disrupted sleep, fatigue, and neurological symptoms (dizziness, numbness, tingling, impaired cognition) often leads to decreased activity, which if you were treating like an acute pain, makes a lot of sense. But even short stretches of decreased activity begin to impact your body's conditioning; flexibility, muscle strength, and stamina all start to decrease with as little as a week of inactivity.

This leads to a troubling cycle for those with chronic pain:



Question: How do your FMS symptoms result in this cycle?

Reduced activity also provides less opportunities for your body senses to be stimulated. This can increase your sensitivity and attention to pain sensations, but also decreases some of your body's natural defenses against pain. Physical activity promotes the production of endorphins; your body's natural painkillers and decreased activity is associated with increased risk of depression which will make your motivation sink even lower. So what do you do? How are you supposed to know what to do and when? People with FMS have a narrow therapeutic window for exercise, which means that too much or too little exercise worsens the pain. An exercise prescription includes the following components which follows the F.I.T.T. principle (**F**requency, **I**ntensity, **T**ime and **T**ype) of exercise.

1. The best activities to choose are ones that you will actually do. Find things that you enjoy, or find ways to make them enjoyable. You may also want to alternate different activities to reduce boredom. Exercise with a friend, play with your kids, enjoy the outdoors, or rediscover a forgotten leisure activity.
2. Learn to listen *correctly* to your body. This is particularly difficult for people with chronic pain. At first, it might be best to judge your effort rather than your pain level or fatigue, but over time, you'll relearn the difference between chronic pain and acute injury. Hurt and Harm are not the same thing. You will most likely feel some discomfort and soreness as you begin to increase your activity. Most athletes will describe the "burn" that comes after a good workout. The difference is you need to relearn what this "hurt" feeling is compared with pain associated with actually harming yourself.
3. The kind of exercise matters. Evidence shows that while some activities such as Tai-chi or Qigong can be very relaxing, more active types of activities are needed to improve the conditioning of your body and release endorphins. You also need a mix of activities to target your muscle strength, flexibility, and endurance.

4. The amount of activity is also important, but don't get caught up in the "rules" such as needing to do continuous exercise for 30 minutes. While that might be an ideal goal, it may be more reasonable for you to do 3-10 minute sets of exercise instead of one-30 minute stretch (see "Setting the pace"). Easy, controlled repetitions with a relaxed pause between each repetition are a great way to approach strength and flexibility building activities. These activities should provide a gentle stretch, and 5-10 repetitions are a good place to start.
5. Don't forget your warm-up! Whether one is performing a stretching or strengthening exercise, it is important to do a warm-up. This can be accomplished by either actively moving with gentle range of motion or even a warm bath.

Question: How can you use the FITT principle? Can you think of an exercise plan you could do *right now* ? Make sure you keep the 5 suggestions in mind when you are designing your own program. How does your program include each of these suggestions?

Setting the Pace: Work Smarter not Harder!

Listen to Linda's experience with exercise on the audioclips accompanying this unit. People, especially people with chronic illnesses, tend to approach activity with two different mindsets; either activity avoidance or over-activity. Think about yourself. Which one do you tend to fall into? Most people will find that, like Linda, they alternate between both avoidance and over-doing it.

Question: Do you fall into the activity avoidance or over-activity mindset? Give an example when you found yourself following one or both of these mindsets.

There are three main points to think about when planning on increasing your activities:

1. A good rule of thumb is to plan to start with by doing 10-20% less than you realistically estimate you can do. This slow-start may seem like a cop-out, but it will help you ease into activity without causing greater harm and helps set you up for success. Remember, success breeds success, so if you get through some increased activity without experiencing too many negative consequences, you are more likely to do the activity again. The converse is also true. Recall the old Aesop's fable of The Tortoise and the Hare? Slow and steady wins the race!
2. Alternate periods of activity and rest. This may seem more natural for small, clear exercises such as strength-building repetition exercises, but is equally important when pacing your activities throughout the day. And when we say activity, this could be anything, and not just traditional exercise. Have pre-planned periods of rest between activities. This will help you avoid falling into the trap of doing too much while still pushing to increase activity throughout the day. Again, start slow, with longer breaks, and

then increase your activity while decreasing breaks as you get stronger. For example, you may start with being active for 1 hour, followed by a 15-20 minute break, and then cycling between 1 hour activity and 20 minutes rest. Again, your mind may be telling you that you need to complete an activity before resting, or that you should be getting more done. The reality is that pre-planned breaks, even if they mean interrupting an activity, are the best way to insure that you don't over-do it.

3. Don't get stuck on all-or-nothing. Set out some goals based on your values. What do you want to accomplish? What are some things you need to do every day? It can be helpful to write out things that you want (or need) to include in your daily life. For most people, these will involve tasks such as household maintenance, leisure, vocational, physical, and social activities. If you really struggle to get things done during the day, it can be helpful to write out a schedule and stick to it regardless of how you feel. That doesn't mean you shouldn't listen to your body at all, just make sure you are always moving towards your valued life. One strategy that can be very helpful is having a plan A for when you are feeling it is a good day, a plan B when you are feeling about 50%, and a plan C for those days when you feel that you can perhaps get one thing on your list done. This type of flexible planning helps prepare you so you are never disappointed and will be much less likely to over-do it. For example, if you are really tired one day, is there a household chore you can do that requires less energy? Accomplishing something, even if it isn't exactly what you initially planned, is always better than nothing.



Get to know your own body, schedule, and be honest with yourself. Attending set classes may be a great idea for some people as classes can provide structure and often include a social component. The downside of set classes is that if you don't feel like you can attend at some point, you lose out on your opportunity to participate. If you have trouble committing to a set time, look for exercise passes that allow flexibility such as drop in sessions. Many fitness facilities, yoga studios and swimming pools offer this type of service. Then commit to exercising a certain amount of time rather than one specific time.

Question: Think about your exercise plan from the previous section. How can you include good pacing into that plan?

Question: Think about some daily activities such as laundry, vacuuming, meal preparation, and financial planning/bill payments. How can pacing help you accomplish all of the to-dos without making your FMS symptoms worse than they need to be?

Unit 4: Cognitive Defusion (or Thinking is not all that!)

Our ability to think and use language has in many ways been both a blessing and a curse. While it has allowed us to accomplish many amazing things that otherwise would never be accomplished, it also causes us to suffer in ways that until recently we could not fully understand. Fortunately, recent research has identified that it is our mind's ability to relate (or "fuse") events in our environment to our thoughts, feelings, behaviors, and physical sensations in virtually random ways that contributes to both our creativity and emotional and physical suffering. Furthermore, we have a strong tendency to do this quite automatically. What this all means is that whenever we believe that our thoughts are what they say they are, that is, we "buy" into them entirely at face value, we become increasingly inflexible when it comes to living life according to what is most important to us. That is, we lose our direction. It is also very important to notice that although this chapter deals with the pitfalls of thinking per se, the principles found herein apply equally well to feelings, behaviors, and physical sensations, such as pain, that are commonly linked to our thoughts. This chapter is all about how to "defuse" from our thoughts, and their associated feelings, behaviors, and physical sensations, when they are not adaptive, in order to get our lives back on track.

Think of a word, any noun that comes to mind, and write it here: _____.

Now think of a second noun and write it here: _____.

Think about the two words you wrote down. How the two words are similar? Got it? Now how is the first word better than the second? The second task may have been a bit harder than the first, but chances are, if you stuck with it, you were able to find some way that the first word is better. This is because we all have the capacity to relate things to one another, no matter how different they are on the surface. This verbal problem solving skill allows us to think through many complex problems without having to actually try all of the different solutions before coming up with a good one. But this skill can also cause us to relate words with sensations and emotions.

Not sure? Try this. I want you to say the word "milk" out loud. Go on, try it. Now watch what happens in your mind when you say the word. Did saying the word milk actually make you think of a cold, white glass of milk? It does for most people. Now say the word again and really concentrate on all the other thoughts and sensations that come up. You may have been able to *taste* milk, or smell it, or feel the texture of milk as you drink it. Or it may have brought back a memory of having milk when you were younger. All of this from saying a simple word! Now, I want you to start saying the word "milk" again, as fast as you can while still pronouncing it clearly. Keep saying "milk" for at least a minute. What happens when you just keep saying the word? For most people, after saying the same word for awhile, all of the thoughts, emotions, and sensations they initially felt tend to fade away, and the word just becomes a nonsense thing without any meaning.

Question: What was the “milk” exercise like for you? Did you “smell”, “see”, or “taste” milk? Did saying the word elicit any memories? Any feelings?

Now try this experiment with a word that may be a lot more loaded for you: maybe pain or Fibro. What happens when you just keep saying the word over and over again?

Question: What was the FMS word exercise like for you? What word did you use? Do you find that the word lost some meaning after you said it over and over again? If not, you may need to say the word even more. Strong associations can take more time and effort to break than ones with less emotional attachment (e.g. milk) do.

We are conditioned that some things go together. Finish the following sentences:

Blonds have more _____.

There’s no place like _____.

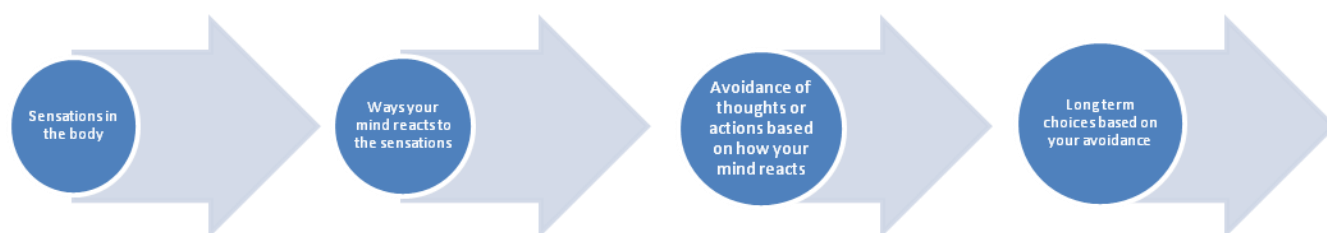
Life is like a box of _____.

Chances are you came up with “fun”, “home”, and “chocolate”. You may have tried to come up with different words because you knew what we were getting at, but you probably had to work to come up with something different. Thoughts by themselves aren’t very dangerous- they are just nonsense symbols that are going around and around. We get ourselves into trouble when we take these words as truth and expect them to transfer into actions. For example, a thought of “I’ll call my friend tonight” might get us to pick up the phone and make a call to a particular person. And “I’m so depressed” may end up translating to staying in bed all day. Or “I’m so tired of being in constant pain”, if taken as literal truth may turn into you actually identifying yourself as someone with pain who can’t do anything. All this from a single thought! The problem here isn’t actually the thoughts, but what you do with them.

In previous chapters, we have talked about how avoidance can play a role in maintaining your actions and feelings. The same is true for thoughts. Just like the fill-in-the-blank examples above, if you try to avoid certain thoughts, or do things when those thoughts arise to stop thinking about them, you may in fact be strengthening the very ideas you are trying to avoid.

Here’s another example. For the next 2 minutes, do not think of chocolate ice cream. Whatever you do, try not to think of any of your experiences with chocolate ice cream. Don’t think about the creamy texture or the delicious taste of the chocolate. Don’t think of it in an ice cream cone or in a sundae. Don’t think about how cool and refreshing it is on a warm day. Don’t think about your favourite experiences having chocolate ice cream with family or friends. Under no circumstances are you to think of chocolate ice cream. Think of anything else but chocolate ice cream. Take a couple of minutes and really put some effort into not thinking about chocolate ice cream. Start now.

What went through your mind when you were doing the “chocolate ice cream exercise? You probably thought quite a bit about chocolate ice cream. And then every time you did, did you try to change what you were thinking about? And how frustrating was it that you just kept thinking about a chocolate sundae? There are thousands of other things you could be thinking about, but you probably just kept coming back to the one thing you were supposed to avoid. The more you try not to have a thought, the more you are likely to have it. You can use your verbal skills to try to suppress thoughts you don’t want to have but in the end, you usually end up thinking more about what you were trying to avoid and can feel like your thoughts must translate to literal actions. Instead, what we are proposing is for you to start looking at your thoughts rather than from them. The skill here is to look at your thoughts, watch them come and go, without attaching yourself to them. Pain; and everything that goes along with it occurs in a nice little chain.



There is some benefit with our reliance on words. Sometimes, making small changes in the words we use can have a huge impact on the meaning of an idea.

Take these examples:

“I would to come to the movie with you but I am in so much pain”.

“I need to do my shopping but I know how much it is going to hurt”

“I’d like to go to my friend’s party, but I’m feeling so tired”.

All of these statements generally relay the inability of the speaker to perform the action. Now watch what happens when we change only one word in the sentences above:

“I would like to come to the movie with you and I am in so much pain.”

“I need to do my shopping and I know how much it is going to hurt.”

“I’d like to go to my friend’s party, and I’m feeling so tired”.

The second set of statements is identical to the first, except they use the word *and* instead of *but*. This small change alters the way you understand the statement to mean that you can accomplish both parts of the statement rather than one or the other. Look back at some of your pain thoughts from your coping diary. Are there any statements that are *but* statements? “I would like to be able to help my family *but* I can’t because I’m so tired all of the time.” Change the wording to

reflect and wherever you have a but; this simple verbal game can give you an entirely new outlook on your disease. You can have Fibromyalgia AND live a life you value. It doesn't mean that you'll now live in Ozzy & Harriet land, but you can trick your mind into looking at the world a bit differently by using the way our verbal minds work to your advantage.

Question: How can changing a few simple words change the entire feeling of a sentence? Can you give one or two examples?

What are some ways that your thinking has an effect on your life? Sometimes, we have rules that we tell ourselves. These rules can have consequences when they lead to avoidance or when we get stuck in our minds rather than focusing on our current actions. The following is a pain diary written by Jennifer describing some of the thoughts she had across a day, and what those rules really mean for her.

Jennifer's pain diary:

Pain thought	What rule leads to
Woke up with pain	You won't be able to get anything done- another wasted day
I can't work if I'm in pain	Once the pain is gone I'll go back to work
I am being punished and that's why I'm in pain	I'm a bad person and if I could just do the right thing, I wouldn't feel like this
Exercising will make the pain worse	Fix the pain then I'll be able to exercise
I can't use medication on the job	Fix the pain and you can go back to work
It's not fair that I have to live like this	The world is a cruel and unfair place. I can never get ahead.

Now you try to complete the diary with some of your thoughts. Be honest with yourself. What are some of the ways your mind works the rules you have about your pain?

Your pain diary:

Pain thought	What rule leads to

But what happens when you just can't seem to let go of your difficult thoughts? That's when it can be helpful to notice what is going through your mind but not try to control it. What this offers is the permission to have your thoughts, but to gain enough distance from your thoughts to make choices about your actions, without the influence of the ever churning mind. Previous researchers have coined the term *cognitive defusion* to describe the act of getting distance from your thoughts.

Click on the audio clip titled "Leaves floating down a stream" and complete the exercise. You can also listen to a similar audioclip called "Moving train cars" These are good metaphor for allowing your thoughts to be a part of your experience without being in the driver's seat. You can have your thoughts without *acting* from them.

Question: What was the "Leaves floating down a stream" or "Moving train cars" exercise like for you?

Sometimes our thoughts can be quite adaptive. For example, say you hear a noise coming from your car. There are a couple things you could do. You could immediately pull over, abandon your car, and never return. Unfortunately, that course of action will leave you without a car and probably have a significant impact on your life. You could also try to ignore the sound. Again, avoiding the sound for too long also could have significant impact if there is something seriously wrong with the engine. Instead, if you bring the car into a mechanic the next time you have a chance, it will cost you some money, but you'll be able to keep using the car. Pain is a lot like

the car; you can try not to think about it, or you can try to avoid it, but ultimately if you want to live your valued life, you'll need to notice the pain but not get so attached to it you become paralyzed by the thoughts, feelings, and sensations that come along with it (your dirty pain).

Different people relate to different types of cognitive defusion strategies. Below are some other common strategies that may feel more natural to you:

Treat the mind as a separate external event	Think to yourself "Oops: There goes my mind again."
The Mind	Treat "the mind" as an external event, almost as a separate person (e.g., "We'll, there goes my mind again" or "My mind is worrying again").
Mental appreciation	Congratulate yourself "Wow- I'm really good at sarcasm. Thanks, mind. You're doing a great job worrying today!"
"Buying" thoughts	Use active language to distinguish between thoughts that just occur and the thoughts that are believed, e.g., "I guess I'm buying the thought that I'm bad."
Pop-up mind	Treat your thoughts like internet pop-up ads
Cell phone from hell	Imagine your mind as a constant chatter you can't turn off. "Hello, this is your mind speaking. Do you realize you need to worry right now? Why aren't you worrying? You should be worried about this."
Putting it out there	Write down a negative evaluation you are ready to defuse from (e.g. unlovable, sick, mean, useless) on a name tag and wear it. Don't explain it to anyone for awhile ...just notice how it feels to have it out there.
Think the opposite	If your mind is stopping you from doing something, practice deliberately engaging in a behaviour while trying to command its opposite. For example, get up and walk around while saying, "I can't move while I'm reading this."
Thoughts are not causes	If a thought seems to be a barrier to an action, ask yourself, "Is it possible to see that thought, as a thought, AND do x?"
Monsters on the bus	Treat unpleasant thoughts, feelings, pain, and fatigue as monsters on a bus you are driving. See if it is okay just to keep on driving rather than doing what they say or trying to get them to leave.

Ok, you're right. So now what?	If you're fighting for a thought to be "right", even if it doesn't help you move forward, assume you are right, and ask yourself what you can do to move forward from here.
Carry cards	Imagine writing down all of your thoughts on credit card sized pieces of paper. Notice that you can carry them around with you without losing the ability to keep moving ahead with your life.

Question: Which of the cognitive strategies did you try? Did some work better than others for you or were they all the same? How do you think these strategies could help you live your life?

Try the "Catching your thoughts exercise" from the audioclips accompanying this unit.:

Question: Describe what happens as you start to label your thoughts. You may be asked to describe multiple days of experience with these exercises on your unit assignment before being able to move on to the next unit.

Unit 5: Mindfulness & Self-as-Context

Mindfulness is a special form of awareness. It involves paying attention to your current experience, generally in a non-judgmental, compassionate, and non-controlling manner. Mindfulness comes from Eastern spiritual and religious traditions; however, it has also been found to be an effective strategy even when removed from any spiritual or religious context. That is to say that even though the idea of Mindfulness originated from spiritual and religious ideas, you don't need to partake or believe in those ideas in order to benefit from developing mindfulness within your own life.

The specifics of what is meant by mindfulness can vary but always includes some component of learning to pay attention to whatever you are experiencing in the present moment instead of getting caught up in thoughts and feelings about the past or future. Mindfulness is not just a skill that you can master; it is more of a process, a good habit that requires practice.

Think about your day. There are probably hundreds of things you do each day without even thinking about them. For example, you may no longer think about walking, you just put one foot in front of the other. And eating just involves putting food in your mouth but you probably don't consciously think about chewing or swallowing. What is also unique about these skills is that you can't really teach someone to do them just by talking to them about it; everyone has to practice the skills themselves. You develop these complex skills through experience. Think about some other complex skills that you may have. How did you learn how to ride a bicycle or to swim? Did you read about riding bicycles and swimming and then just suddenly knew how to do it? No. Instead, you learned how to ride a bike or swim by practicing the skill yourself. Mindfulness is a similar kind of skill. While we can tell you about it, and guide you through certain practice exercises, the only way to really learn to use mindfulness is to practice it yourself. And if you don't succeed at first, you need to keep trying and practicing until it does become easier.

Question: What are some things you do everyday without thinking about them? Describe some complex skills that you use all the time without thinking about how to do them, and that you would have difficulty teaching to someone else just by describing it.

Avoiding conflict, painful thoughts, or painful sensations may have become automatic just like eating, walking, or riding a bike. You may avoid many different types of activities without even being aware that you are doing so. You may find that you already notice many of your thoughts, feelings and sensations. But chances are, you associate some form of opinion of these experiences, and that, often critical, opinion results in you trying to control your experience. You may feel pain after going for a walk, and decide that feeling pain is bad (the critical judgment) so you decide you need to try to limit pain again in the future. Or you may try to push through and ignore the pain. Mindfulness falls between these two extremes: it encourages you to pay attention to your present experience while letting go of any judgment regarding that experience.

There are four main skills that can be helpful to keep in mind as you practice mindfulness:

- a) Awareness. You first need to become aware of your thoughts, feelings, and sensations as they *actually are* rather than how you want them to be.

- b) Non-judgmental stance: When you become aware of your experience, try not to let any opinions be associated with that experience. Some people will describe this as trying to be like a scientist: notice what is going on without trying to control it or decide if the experience is good or bad.
- c) Staying in the moment. Let's face it, for most of us, our mind seems to wander after only about 15 seconds. When you realize that, along with our mind's ability to put things together, it's no wonder that your thoughts can quickly go from recognizing you have pain, to wishing the pain would go away, to feeling like you're less useful as a person because you have pain. Learning mindfulness involves staying with the present moment instead of jumping ahead or returning to the past. Given the tendency for our minds to wander, staying in the moment can be very difficult.
- d) Keeping an open mind. This is sometimes known as keeping a beginner's mind and means to look at your thoughts, feelings, and sensations as they actually are without letting what you "know" cloud your experience. Again, taking a scientific or childlike stance of observing your experiences can be a helpful place to start.

Question: List and describe at least 2 main skills needed for practicing mindfulness.

These are not easy things to do, and are probably at least somewhat new to you especially in the context of living with Fibromyalgia. Like any new skill, it will be important to practice mindfulness. We will show you some things you can do to practice mindfulness, but it won't be enough to just try them once. You will probably be most successful with developing your mindfulness skills if you:

- 1) Set aside time every day to practice. You should also set a time limit so that you have a clear timeframe to work within. For some people, setting a timer helps and let's them focus on their mindfulness practice rather than watching the time.
- 2) Find a time & space that limits distractions. While you will eventually want to be able to engage in mindfulness regardless of any distractions in your environment, learning a new skill is tough! Help yourself out by limiting distractions you can control. Find time when someone else is able to take care of the kids, or if they are in bed, when your partner doesn't require your immediate attention, when you aren't about to leave for an appointment, or when your favorite TV show is on.
- 3) Remember that Mindfulness is not the same thing as relaxation. While many people find engaging in mindfulness relaxing, some find it very difficult. In addition, mindfulness is an active process, not a passive one. Make sure you stay active so you are more likely to "fall awake" rather than fall asleep!
- 4) Be compassionate with yourself, but don't make excuses. While mindfulness is an active process, it isn't one that requires much energy so there isn't such a thing as feeling too bad to practice!

Question: How can you set yourself up to be more successful with your mindfulness practice?

Ways to practice mindfulness. The following are specific ideas that are commonly used to practice mindfulness. Eventually, you will want to notice your thoughts using the same kind of attention, but this is a good place to start. You may want to listen to Jennifer’s and Linda’s experiences with mindfulness.

Listen and complete the “Eating a raisin” exercise from the audioclips accompanying this unit.

Question: What was the raisin exercise like for you? Have you noticed anything different about raisins than you have before? Was it possible to look at all the different parts of the raisin without judging it? If not, what effects do you think your opinions had on your experience eating the raisin?

Another option is breathing with awareness:

- a. Sit quietly for about 5 minutes.
- b. Pay close attention to how you breath during this time
- c. What does your breath feel like? Does inhaling feel different than exhaling? What about the temperature of your breath?

This seems like a simple task, but for most people, it’s almost too simple. Breathing is (hopefully!) an example of things that you usually do automatically and without thought. That means that if you were able to sit for 5 minutes, you probably had many other thoughts that went through your head.

What kinds of thoughts did you have? _____

What did you do when you had thoughts? _____

Did you try to get rid of those thoughts? And how? Was it effective?

Now, try the exercise again. This time, if you have any thoughts, notice them, but don’t try to do anything with them. Try not to be critical that you have had a thought or sensation that doesn’t have to do with your goal of noticing your breathing. Instead, think of your thought just floating away like a cloud in the sky and then return your focus onto your breathing.

Question: Was this second experience with 5 minutes of breathing any different than the first? How so?

Click on the audio clip titled “Body scan” and complete the exercise. This will take you about 20 minutes so make sure you have enough time to complete it. What was the body scan exercise like for you? You should practice the body scan as often as possible. Skill building takes time and practice. Does your experience with the exercise change with more practice? Note: you may be asked to submit multiple days of experience with the body scan exercise before moving on to the next unit.

Practicing everyday activities with Mindfulness

Sometimes, like Jennifer, people find it hard to set aside specific times to practice mindfulness. But you actually have lots of opportunity every day to practice activities that are usually done automatically with a mindful attitude. Here are some examples:

Listening to music: Find some soothing new-age, classical, or other slow tempo music. Really focus on the sound and vibration of each note. What feelings or sensations does the music bring up for you? If other thoughts creep into your mind, give yourself some credit for noticing them, and then gently draw your attention back to the present moment and your focus on the music you are hearing.

Cleaning the House: First off, you need to see cleaning as a positive event; or at the very least, a neutral one. Then, once you start cleaning, notice exactly what you are doing as you are doing it. Is the dust flying off the shelf while you run the duster over it? Does it make you want to sneeze? Feel the warm water on your hands as you wash the dishes. Notice the different smells as you use different products. Again, notice if other thoughts come up as you are cleaning (This place is a pigsty! or Why am I always the one that has to clean up? are common thoughts), but rather than staying with those thoughts, bring your attention back to the actual process of cleaning.

Brushing your teeth: Rather than rushing through your morning or bedtime routine, or trying to get other things done while you are brushing your teeth, try focusing your attention on the task. What does it feel like when you squeeze the toothpaste tube? Can you notice the different sensations as you brush your front and back teeth? What about the taste? And do your teeth and mouth feel any different after you rinse? And as your mind starts to wander to what you need to do for the rest of the day, gently bring it back to your present experience with your toothbrush.

Taking a shower: Instead of just singing karaoke, start to notice all the different feelings and sensations while you take a shower. Feel the warm water running over your head and down your body. Does the water make a sound as it empties down the drain? What smells do you notice? And if you are singing, does your voice sound different in the shower than it does in the living room?

Eating meditation: Sit down at a table and try eating your meal without any other distractions: no newspaper, books, TV, radio, or talking. Now, try to pay attention to all parts of your meal. What does the food look like on the plate? What does it smell like? What does it feel like to cut pieces of food? Which pieces of food do you choose to eat? Does each piece smell different as you bring it up to your mouth than when you smell the whole meal? Notice the textures and taste of each piece of food. Chew each piece slowly, and swallow before you pick up the next piece of

food. You might be surprised how much quicker you get full eating this way, and how much more enjoyable your meal can be!

Walking meditation: First off, make sure you have good, comfortable shoes. Flip flops or other non-supportive footwear is a good way to set yourself up for a lot of pain. Begin walking at a comfortable pace. Notice the sensations you feel in your body as you walk. Can you notice the different sensations as you shift your weight from one foot to the other? Feel your arms swinging gently at your side. Notice the feeling of the air around you as you walk. If you find other thoughts coming up as you walk, congratulate yourself for noticing them, but then shift your attention back to the sensations of the present moment in your walk. Feel free to experiment. What changes as you speed up or slow down your pace?

Now that you have a better idea of what mindfulness is, be creative! **What other activities can you think of to practice mindfulness?**

DISCOVERING YOUR OBSERVER SELF

We all have the tendency to form strong opinions about our self and to use those opinions to categorize and evaluate our self. If we over identify with these labels and evaluations we are engaging in a particular form of cognitive fusion. In chapter 5, we saw how whenever we become fused with, and over identify with, our thoughts, we severely limit our ability to behave in a flexible manner when that is called for. In contrast, the observer self is a part of us that we are probably least familiar with. However, this sense of self has been with us our entire life and is free from the attachments that trap the conceptualized self. This will become clear as you work through the exercises to follow. They will help you to defuse from your conceptualized self and discover your observer self.

Examining Your Conceptualized Self

Below are a number of sentences. Fill in the sentences with the first thing that comes to mind:

I am a person who _____

My favorite part about myself is _____

I am a person who does not _____

I have been wronged because other people have _____

Look back at your responses. How did you answer? And what do your answers mean to you? Do you think anyone would argue you are wrong? Correct? Perhaps you have written in something like I am a person who has fibromyalgia. Now, suppose you could wave a magic wand and, Poof!, your fibromyalgia vanishes. What could possibly be wrong with that disappearance? Who would be shown to be wrong if you had written that I am a person who has fibromyalgia and that statement was now inaccurate?

We are all invested in our own stories and labels, even if you hate them. You may distort the world in order to maintain the labels you give yourself. For example, if you said your favourite part about yourself is that you are kind. Are you really? To *everyone*? *All* the time? Probably

Question: Now that you've listened to the metaphor: Can you move ahead with your life, even with all of your worries and problems? And could it be that you, the whole of you, aren't defined by your pain, but rather a container for it?

The Observer Self

The observer self is a place from which conscious observations are made. It has also been described as a sense of pure awareness, pure consciousness, or transcendence that is not thing-like. It is a stable, unchanging part of yourself. Here, you need not be an object of your verbal relations. The observing self comes from a context where you don't have conscious limits. Who was it that ate your breakfast this morning? See if you can take a look at the experience of eating breakfast *through your own eyes*. You can probably do this, even though you aren't there at the moment. This kind of skill also means that you can learn to look at yourself as the sum of all of your experiences rather than focusing on a single aspect.

Assignment: Keep practicing the body scan from the previous unit. You can use the audio clip from unit 6 to help you. You may not notice much effect at first, but over time building your mindfulness skills will be helpful in living your life despite having FMS.

Unit 6: Are You Willing?

In the words of the fictional Jedi Master Yoda: “Do or do not, there is no try.” Acceptance is like this, you can’t *try* to accept or place a limit on the extent you are willing to accept. You either accept or you do not.

Joe the Bum Metaphor (Hayes et al. 1999)

Listen to the audio clips titled “Joe the Bum Metaphor” and “Unwanted Roommate Metaphor” accompanying this unit.

Both of the above audio clips get at the same general idea: That it’s your choice. Question: What do you think this choice is?

At this point, you’ve learned that there is a distinction between you as a conscious, mindful person and your private events. That is to say, your observer self and your conceptualized self. You can (hopefully!) see the difference between your thoughts, feelings, and sensations and what you do about those private events. To truly accept means you have to be willing to feel, sense, and remember all of your private events, fully, and without defence, as they actually are and not as your mind says they should be. The final step is to embrace all of those pieces of yourself and still do whatever it takes to move in the direction of your valued life.

What Willingness is, and is not

Willingness is:

- Holding pain as you would hold a delicate flower
- Embracing pain as you would a crying child
- Looking at pain the way you look at a remarkable piece of art
- Carrying your pain as you would a picture in your wallet
- Honoring your pain the way you would honor a friend by listening
- Abandoning the war with pain like a soldier who puts down his/her weapons to walk home
- Getting with your pain like drinking a glass of pure water or inhaling a deep breath

Willingness is not:

- resisting your pain
- Ignoring your pain
- Forgetting your pain
- Buying your pain
- Doing what your pain says
- Not doing what your pain says
- Believing your pain
- Not believing your pain.

Think back to a situation that you found physically painful, stressful and difficult. It might be a time when you had to sit through a long drive, hosting a party, or rake a huge yard of leaves. Now think about a situation you felt was psychologically distressing such as visiting work while you were on leave, feeling

guilty about not helping more at a birthday party, or talking to your neighbours about why you weren't working. Write down the situations below. Think about what you did, what your mind and body were yelling at you in those situations. What (if any) acceptance approach did you take, or could you take? Once you fill in those columns, reflect on your acceptance approach. Do you feel you were able to live a life you valued in this situation? If not, how could you change your approach in the future to move towards your valued life?

Situation	What your mind and body was yelling at you	Acceptance approach	Future directions

Turning up your willingness dial



Look at these two dials. One represents your discomfort or pain. The other represents your willingness to accept that discomfort. Both dials function like the volume dial on your radio. They go from very low (1) to very high (10). Your discomfort dial is usually out of your control. Someone else decides the volume of that dial. Sometimes, it may be at a 1, but other times it may be at a 10. And there will probably be times that you feel like you can control your discomfort dial. Your mind may try to convince you that “if you don't do x , your discomfort dial will be lower.” Some times, it may even make sense to follow that logic and keep your discomfort dial lower. The trouble comes when you know that if you do x your discomfort dial will probably go

up, but avoiding x brings you further from your valued life. That's when your second dial comes in; your willingness dial. This is a special dial because it's one that you and you alone have complete control over. Only you can choose the volume of your willingness dial, but this dial gets kind of sticky in the middle. This dial works best when it is on 1 or 10, the middle numbers don't really seem to make as much of a difference. Think about those situations you listed in the table above. See if you can turn the volume on your willingness dial all the way up to 10. Go on, try it now. This is a new skill, so it can be hard to do. You'll need to practice turning your willingness dial up, but doing so will be an important step towards living your valued life. You may want to listen to Robert's experience with his own "dials" on the audioclips accompanying this unit.

Robert makes a good point. Part of being able to control your willingness dial is that you can change it for the moments that mean something to you, but you don't have to live with it being at 10 all of the time. By getting into the observer seat, you can see what might be served by turning up your dial and accepting your discomfort. Turning up your willingness dial doesn't mean that you passively accept your fibromyalgia symptoms or ignore them altogether. Willingness and acceptance means you will still need to make choices based on practical outcomes, but the reason to accept is so that you can live a valued life.

Question: Give an example of how you can turn up your willingness dial. Keep in mind that you likely don't have as much control over your pain dial as you would like.

Go back and take a look at your own value compass. Try some of the following suggestions when you are noticing you are avoiding certain thoughts, feelings, sensations, and actions and this avoidance is getting in the way of your valued life.

- Spend some time thinking about why the value you have chosen is important to you. Close your eyes and imagine yourself turning up your willingness dial to act in ways that are consistent with this value.
- Think about times you have tried to control your discomfort dial so that you could live a valued life. Consider how helpful that approach has been. *Question: Provide an example of when you tried to control your discomfort dial.*
- Practice turning up your willingness dial. Try sitting in one place without moving for at least 10 minutes. As you start to get uncomfortable, feel an itch, or feel the need to readjust your body, try turning up your willingness dial to 10 and see if you can be willing to accept the discomfort and resist doing what your mind and body is screaming at you to do. *Question: Describe your experience sitting with the discomfort and turning up your willingness dial.*

Click on the audio clip titled "Getting bigger than your pain". Complete the exercise. What was this exercise like for you? What did you notice that you may not have noticed before?

COMMITTING YOURSELF TO LIVING YOUR VALUED LIFE

Think back to the discussion on values. Remember the bus metaphor? Let's look at driving a bus again. Try to picture yourself driving a bus. You have an assigned route; let's call the route "Your Life". Throughout the route you make stops to pick up passengers. Sometimes the passengers getting on the bus are single people, or families, chatty older folks, young rambunctious children, and annoying teenagers. You get used to seeing the people on your route and may even look forward to seeing them each time you drive the route. One day, a different kind of passenger gets on the bus. This passenger is more of a monster. You may not even notice at first. The new passenger sits quietly at the back of the bus. Over time, it starts to get more disruptive; the new monster passenger sits closer to the front pushing your other passengers out of the seats.

Before you know it, you are no longer able to spend your time talking to the other passengers because the monster begins to take over. This monster starts to tell you which way to go and changes your route. The nerve! How dare this passenger dictate where you should drive! But this monster can be threatening. If you don't follow what it says, it may bite you, so you listen and change the route. Some of the other passengers may no longer get on the bus and you miss them. Now suppose I told you that you can actually ignore the monster? Sure it may threaten you, and will probably get louder and louder in an effort to get you to listen. It makes sense you would be afraid of this monster. But you can chose to be afraid AND drive the same route that you used to. After all, you are the driver. And driving the route you chose will likely take you closer to your previous passengers.

Over the past couple of weeks, you've learned some great skills such as being aware of what is actually going on around you and how to look at your thoughts when your thoughts and actions seem to clump together. How to work with some of your symptoms to improve your sleep, increase exercise safely, and address Fibro Fog. You've had the opportunity to think about what you'd like your life to be and what is important to you. All those skills are good ways to help you shift your perspective, but to really need to live your valued life, you need to actually live it. You need to commit to those changes and actually carry them out.

This step sounds easy, but it isn't. Now that you've had a chance to decide what to do, go do it. It's the Nike slogan: Just do it. That's the big secret: go, right now, without hesitation, and just live your life. So why learn all of the other stuff if the message is just do it? Well using your skills in mindfulness, willingness, and defusion, you are better equipped to look at your obstacles for what they really are and find ways to move towards your valued life despite the obstacles in your path.

You can't always predict what will come up. It's like floating down a river on an inner tube. Sometimes you float peacefully down the river. The current carries you to a certain extent, but sometime that current puts you on a collision course with sandbars or floating debris. Many times, you can't see the debris until it is right in front of you. That's when you need to use your skills (such as a strong back paddle) to get out of the way. Now imagine you are floating down the river of your life, and floating in the direction of your values. While you may not be able to predict all of the obstacles, you can probably think of some that might be in your way. Take a look back at your values from unit 2. For at least 5 of them, write in the value in the table below, followed by some obstacles you think may come up. These may be obstacles you've encountered

before, or some new ones. Think about how you've previously coped with these obstacles and write it down. Now that you know more about acceptance, mindfulness, and defusion, what are some other things you can do to address the obstacles in your path? (*Hint: an example from Jennifer follows below if you need some help getting started*)

Value	Obstacles	Old strategy	New plan
	<ul style="list-style-type: none"> • _____ • _____ • _____ 	<ul style="list-style-type: none"> • _____ • _____ • _____ 	<ul style="list-style-type: none"> • _____ • _____ • _____
	<ul style="list-style-type: none"> • _____ • _____ • _____ 	<ul style="list-style-type: none"> • _____ • _____ • _____ 	<ul style="list-style-type: none"> • _____ • _____ • _____
	<ul style="list-style-type: none"> • _____ • _____ • _____ 	<ul style="list-style-type: none"> • _____ • _____ • _____ 	<ul style="list-style-type: none"> • _____ • _____ • _____
	<ul style="list-style-type: none"> • _____ • _____ • _____ 	<ul style="list-style-type: none"> • _____ • _____ • _____ 	<ul style="list-style-type: none"> • _____ • _____ • _____
	<ul style="list-style-type: none"> • _____ • _____ • _____ 	<ul style="list-style-type: none"> • _____ • _____ • _____ 	<ul style="list-style-type: none"> • _____ • _____ • _____

Jennifer's values:

Value	Obstacles	Old strategy	New plan
Want to be present for my children	<ul style="list-style-type: none"> • <u>pain won't allow me to sit at games</u> • <u>can't get housework done and play with them</u> • _____ 	<ul style="list-style-type: none"> • <u>Avoid going to games</u> • <u>Tried to do both at once- neither very well</u> • _____ 	<ul style="list-style-type: none"> • <u>Turn up my willingness dial for the game at least once per week</u> • <u>Be mindful of each activity</u> • _____
Would like to go to an evening class to learn Spanish	<ul style="list-style-type: none"> • <u>Never been very good at school</u> • <u>Have trouble remembering names and phone numbers, how can I learn a new language?</u> • <u>How can I justify spending more time away from my family?</u> 	<ul style="list-style-type: none"> • <u>Avoid going to any classes</u> • <u>Explain to others I'm not interested or don't like learning</u> 	<ul style="list-style-type: none"> • <u>Use my cognitive defusion skills to look at abilities realistically</u> • <u>Be honest with others about any deficits I have and seek help when needed</u> • <u>Be understanding towards myself: I know we don't want to be poor, but set up a budget before giving up the goal to see if it is realistic</u>

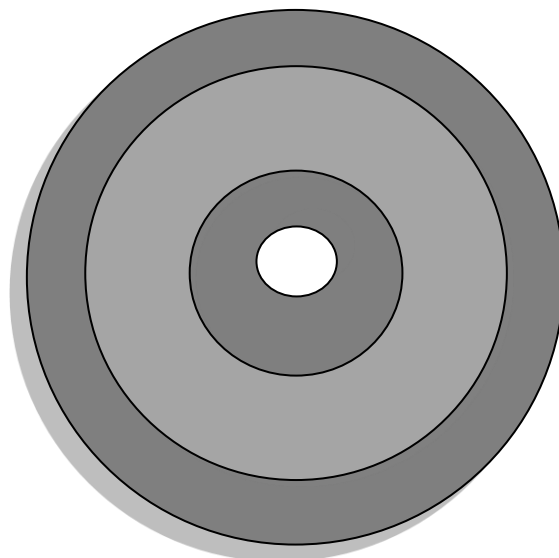
You move towards your valued life by taking one step. Then another. Then another; until you find yourself back in a life you value.

Question: Take a look at one of your valued life domains. Write down below which one you would like to focus on (it's ok if what you chose is different than what you initially wrote in the Values unit).

Now consider how you can completely express your values in this area. Write down some ideas you have:

Next, come up with specific actions you can take to move in the direction of your values:

Now it's time to commit. Make a commitment to yourself that you will do at least one thing to move in the direction of your value each day. Below you'll see a Bull's eye image. You will probably need to make copies of it so you can use the image over and over again. Each day, record how vital you felt in regards to your valued life in the domain you listed. How close did you get to the Bull's eye? If you didn't quite make it, think about how you can refine your actions so that tomorrow you can hit the bull's eye.





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HEALTH RESEARCH ETHICS BOARD (HREB)
CERTIFICATE OF FINAL APPROVAL FOR AMENDMENTS AND ADDENDUMS

PRINCIPAL INVESTIGATOR: Ms. H. Simister and Dr. R. Skrabeczek	INSTITUTION/DEPARTMENT: UofM/Psychology	ETHICS #: HS1535B (formerly H2012:179)
HREB MEETING DATE (if applicable):		APPROVAL DATE: July 16, 2012
STUDENT PRINCIPAL INVESTIGATOR SUPERVISOR (if applicable):		

PROTOCOL NUMBER:	PROJECT OR PROTOCOL TITLE: Online Acceptance-Based Behavioural Treatment for Fibromyalgia (Linked to H2010:075 & H2010:336)
SPONSORING AGENCIES AND/OR COORDINATING GROUPS: N/A	

REMINDER: THE CURRENT HREB APPROVAL FOR THIS STUDY EXPIRES: May 28, 2013

REVIEW CATEGORY OF AMENDMENT:	Full Board Review <input type="checkbox"/>	Delegated Review <input checked="" type="checkbox"/>
Submission Date of Investigator Documents: July 16, 2012	HREB receipt date of Documents: July 16, 2012	

THE FOLLOWING AMENDMENT(S) and DOCUMENTS ARE APPROVED FOR USE:

Document Name	Version(if applicable)	Date
Protocol: Protocol		July 12, 2012
Consent and Assent Form(s): Research Participant Information and Consent Form		July 12, 2012
Other: Additional Tests administered to participants Free Press Advertisement Addition of Dr. R. Skrabeczek as Co-PI per report dated July 16, 2012		July 12, 2012 July, 12 2012

CERTIFICATION

The University of Manitoba (UM) Health Research Board (HREB) has reviewed the amendment to the research study/project named on this **Certificate of Approval** as per the category of review listed above and was found to be acceptable on ethical grounds for research involving human participants. The amendment and documents listed above were granted final approval by the Chair or Acting Chair, JM HREB.

HREB ATTESTATION

The University of Manitoba (UM) Health Research Board (HREB) is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement 2, and the applicable laws and regulation of Manitoba. In respect to clinical trials, the HREB complies with the membership requirements for Research Ethics Boards defined in Division 5 of the Food and Drug Regulations of Canada and carries out its functions in a manner consistent with Good Clinical Practices.



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HEALTH RESEARCH ETHICS BOARD (HREB)

CERTIFICATE OF ANNUAL APPROVAL

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PRINCIPAL INVESTIGATOR: Ms. H. Simister	INSTITUTION/DEPARTMENT: UofM / Psychology	ETHICS #: HS15358 (H2012:179)
HREB MEETING DATE (if applicable):	APPROVAL DATE: May 17, 2013	EXPIRY DATE: May 28, 2014
STUDENT PRINCIPAL INVESTIGATOR SUPERVISOR (if applicable): Dr. G. Tkachuk & Dr. J. Pear		
PROTOCOL NUMBER: NA	PROJECT OR PROTOCOL TITLE: Online Acceptance-Based Behavioural Treatment for Fibromyalgia (Linked to H2010:075 & H2010:336)	
SPONSORING AGENCIES AND/OR COORDINATING GROUPS: NA		
Submission Date of Investigator Documents: April 29, 2013		HREB Receipt Date of Documents: April 29, 2013
REVIEW CATEGORY OF ANNUAL REVIEW: Full Board Review <input type="checkbox"/> Delegated Review <input checked="" type="checkbox"/>		
THE FOLLOWING AMENDMENT(S) and DOCUMENTS ARE APPROVED FOR USE:		
Document Name(if applicable)	Version(if applicable)	Date

Annual approval

Annual approval implies that the most recent **HREB approved** versions of the protocol, investigator brochures, advertisements, letters of initial contact or questionnaires, and recruitment methods, etc. are approved.

Consent and Assent Form(s):

Research Participant Information and Consent Form

July 12, 2012

CERTIFICATION

The University of Manitoba (UM) Health Research Board (HREB) has reviewed the annual study status report for the research study/project named on this **Certificate of Annual Approval** as per the category of review listed above and was found to be acceptable on ethical grounds for research involving human participants. Annual approval was granted by the Chair or Acting Chair, UM HREB, per the response to the conditions of approval outlined during the initial review (full board or delegated) of the annual study status report.

HREB ATTESTATION

The University of Manitoba (UM) Health Research Board (HREB) is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement 2, and the applicable laws and regulations of Manitoba. In respect to clinical trials, the HREB complies with the membership requirements for Research Ethics Boards defined in Division 5 of the Food and Drug Regulations of Canada and carries out its functions in a manner consistent with Good Clinical Practices.

QUALITY ASSURANCE

The University of Manitoba Research Quality Management Office may request to review research documentation from this research study/project to demonstrate compliance with this approved protocol and the University of Manitoba Policy on the Ethics of Research Involving Humans.



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HEALTH RESEARCH ETHICS BOARD (HREB) CERTIFICATE OF ANNUAL APPROVAL

PRINCIPAL INVESTIGATOR: Ms. H. Simister	INSTITUTION/DEPARTMENT: LoFM / Psychology	ETHICS #: HS15358 (H2012:179)
HREB MEETING DATE (if applicable):	APPROVAL DATE: May 20, 2014	EXPIRY DATE: May 28, 2015
STUDENT PRINCIPAL INVESTIGATOR SUPERVISOR (if applicable): Dr. G. Tkachuk & Dr. J. Fear		
PROTOCOL NUMBER: NA	PROJECT OR PROTOCOL TITLE: Online Acceptance-Based Behavioural Treatment for Fibromyalgia (Linked to H2010:075 & H2010:336)	
SPONSORING AGENCIES AND/OR COORDINATING GROUPS: NA		
Submission Date of Investigator Documents: April 17, 2014		HREB Receipt Date of Documents: April 17, 2014
REVIEW CATEGORY OF ANNUAL REVIEW: Full Board Review <input type="checkbox"/> Delegated Review <input checked="" type="checkbox"/>		
THE FOLLOWING AMENDMENT(S) and DOCUMENTS ARE APPROVED FOR USE:		
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