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WITH FMS

Infrared Sauna and Swedish Massage Will Improve Sleep and Decrease Pain in a Patient with

Fibromyalgia

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Abstract

Objective: To evaluate the effects of Infrared Sauna and Swedish massage with regard to pain and sleep in a patient with Fibromyalgia.

Background: The participant of this study is a 58 year old female who has been suffering with symptoms of Fibromyalgia for the past three years. Patient scored moderately high on the Mcgill Pain Questionnaire (MPQ), Pittsburgh Sleep Quality Index(PSQI), Fibromyalgia Impact Questionnaire Revised (FIQ-R) and on an initial Tender point palpation exam, 15 out of a potential 18 points palpated were tender.

Methods: The study consisted of five one hour weekly treatments whereby patient spent 15 minutes in the infrared sauna at a decreased temperature of 60 degrees celcius and a 45 minute full body Swedish massage. The autonomic nervous system was assessed by measuring blood pressure and heart rate, utilizing the Visual Analog Scale to assess pain and having patient maintain a sleep journal to document quality and quantity of sleep throughout the course of treatments.

Results: Positive results were found to occur almost immediately. Patient's experience of pain decreased, reduction of the sympathetic branch of the nervous system began to show more significant results during the second week of treatment and sleep showed more of an improvement toward the final two weeks of treatments.

Conclusion: The combination of Infrared Sauna and Swedish massage are effective modalities to use on a patient with Fibromyalgia to assist with sleep and reduction in pain experience. Significant results were demonstrated however the study is not without limitations.

Keywords: Swedish Massage, Infrared Sauna, Fibromyalgia, Chronic Pain, Sleep

Introduction

Fibromyalgia (FM) is a painful non-articular rheumatic condition of at least three months duration, characterized by widespread muscular achiness and specifically the palpation of tender points at 11 of 18 prescribed locations on the body (Rattray F, & Ludwig L, 2000). Robert A. Hawkins (2013) suggests that Fibromyalgia is a chronic, potentially disabling condition defined by core symptoms of widespread pain, stiffness, fatigue, sleep disturbance, and cognitive dysfunction (Wolfe F, Clauw DJ, Fitzcharles MA, et al., 2010). However, a lack of definitive muscle pathology has made FM both a diagnostic and a treatment puzzle (Liptan G., et al, 2013). While, Tortora G. J, and Derrickson B (2012, p.329) state there is no specific identifiable cause, Hawkins R. A (2013), puts forth that; Genetic, sleep, nervous system, infection, and psychological factors are all potential contributors to the presence of fibromyalgia. Rattray & Ludwig (2000) suggest that symptoms can be triggered or aggravated by overexertion, lack of exercise, stress, anxiety, depression, lack of or poor quality of sleep, trauma, extremes of temperature or humidity (especially cold and wet weather) and infectious illness. Dixon E, et al. (2016) shared many chronic pain conditions that are currently poorly understood may share a common feature of central sensitization (Yunus, 2007). Dixon E, et al (2016) also puts forward that central sensitization is an amplified state of neural signaling in the central nervous system (CNS) that is implicated in the pathogenesis of several chronic conditions that primarily involve pain (Kaya et al., 2013; Lluch et al., 2014; Wang et al., 2014). Liptan G., et al (2013) suggests that Central sensitization occurs when there is persistent peripheral nociceptive input leading to an increased excitability of the dorsal horn neurons of the spinal cord. Liptan G., et al (2013) continues on to say that there is persuasive evidence that chronic pain repetitively activates both A-delta and C fibers, which stimulate the release of neurotransmitters and neuromodulators such

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as substance P, nerve growth factor, glutamate and calcitonin gene-related peptide (Urban and Gebhart, 1999). Tortora G.J & Derrickson B (2012) state that substance P, is released by neurons that transmit pain-related input from peripheral pain receptors into the central nervous system, enhancing the perception of pain. In relation to pain, Hawkins R. A., (2013) expressed “For Example, Russel and Larson found a sustained 2- to 3-fold elevation of CSF (Cerebral Spinal Fluid) substance P and other neuropeptides that facilitate pain in patients with fibromyalgia, as well as diminished metabolites of CSF serotonin, norepinephrine, and dopamine, which act to inhibit pain perception (Russel L. J., Larson A. A., 2009). In these cases of chronic central sensitization and amplification of sensory inputs may be manifested as allodynia, hyperalgesia, sleep disturbances and cognitive disruption (Dixon et al, 2016).

Martinez-Lavin M., (2007) puts forth that patients with Fibromyalgia (FM) frequently have dysfunction of the stress response system. He states that the stress response system is a delicate, dynamic system that vertebrate animals have in order to maintain homeostasis. Martinez-Lavin M., (2007) goes on to discuss that the main components of the system are the autonomic nervous system (ANS) and hypothalamic-pituitary adrenal axis. Hawkins R A, (2013) mentions that emotional and physical stress activates the hypothalamic-pituitary-adrenal (HPA) axis. In addition, Hawkins R A., (2013) puts forward that the causal relationship between HPA dysfunction and fibromyalgia is unclear, but early childhood stress could precipitate the HPA abnormality (Heim C, Ehlert U, Hellhammer DH, 2000). Martinez-Lavin M (2007) continues to discuss that the Autonomic nervous system is the main regulatory system of the body in charge of maintaining essential involuntary functions such as the so-called vital signs (blood pressure, pulse, respiration and temperature). The Autonomic nervous system is activated by centers located in the spinal cord, brain stem, hypothalamus and thalamus (Martinez-Lavin M., 2007).

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As presented above there are several contributing factors to fibromyalgia, and sleep is also another big player, Bigatti S. M, Hernandez A. M, Cronan T.A, & Rand K. L, (2008) demonstrate that analysis of electroencephalograms indicates that patients with FMS take longer to fall asleep and have frequent arousals, extended stage 1 sleep and little slow wave sleep, which may indicate a vigilant arousal state during sleep. Bigatti S. M, Hernandez A. M, Cronan T. A, & Rand K. L, (2008) Go on to state that essentially a good night's sleep increases our ability to resist bouts of pain; poor sleep on the other hand, especially when chronic may increase our vulnerability to symptoms. Melzack R., (2001) proclaims, yet another effect of pain, especially after serious injury or disease, is to make us rest, thereby promoting the body's healing processes. For example lack of sleep leaves individuals more susceptible to infection, elevated resting blood pressure and decreased muscle sympathetic nerve activity and increased activity of the autonomic nervous system (Bigatti S. M, Hernandez A. M, Cronan T. A, & Rand K.L, 2008).

Hawkins R. A., (2013) reports that as a condition that affects 2% of the US population and is 7 times more prevalent in women than in men,(Lawrence RC, Felson T, Helmick CG, et al., 2008) fibromyalgia is one of the most common disorders seen by primary care physicians. Tortora G. J., and Derrickson B., (2012 p. 329) discuss that treatment consists of stress reduction, regular exercise, application of heat, gentle massage, physical therapy, medication for pain, and a low-dose antidepressant to help improve sleep. Again, Hawkins R. A., (2013) provides a very helpful image to better understand fibromyalgia, stating:

One useful metaphor to explain central pain processing abnormalities is an overly sensitive home smoke alarm that goes off every time the oven is turned on. It is a false alarm shrieking "fire" in the absence of fire. An overly sensitive pain processing system

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will shriek pain in the absence of peripheral pathology, but the perception of pain is very real.

Thermal radiation (or infrared) is a band of energy in the complete electromagnetic spectrum and it has been used effectively for millennia to treat/ease certain maladies and discomforts (Vatansever F, Hamblin M R, 2012). Vatansever F, Hamblin M. R., (2012) quote that in the Infrared (IR) radiation bands, only far infrared (FIR) transfers energy purely in the form of heat which can be perceived by the thermoreceptors in human skin as radiant heat (Plaghki L, Decruynaere C, Van Dooren P, Le Bars D., 2010). Again, Vatansever F, Hamblin M. R., (2012) state that FIR wavelength is too long to be perceived by the eyes, however, the body experiences its energy as a gentle radiant heat which can penetrate up to 1.5 inches (almost 4 cm) beneath the skin. As well, Shui S, Wang X, Chiang J. Y., and Zheng L., (2015) suggest that Far-infrared (FIR) rays enable multiple energy transfer as deep as 2–3 cm into subcutaneous tissue without irritating or overheating the skin and then accelerate blood flow, leading to an increase in shear stress, followed by an increase in endothelial nitric oxide synthase activity and nitric oxide (NO) production (Leung T-K, et al 2009). Tortora G. J., & Derrickson B., (2012 p.482), state that endothelial cells in blood vessel walls release NO, which diffuses into neighbouring smooth muscles cells and causes relaxation. In a study conducted in 2005 by Masuda A, et al., they put forward that it has been reported that thermal therapy reduces myotonia, improves circulation, and relieves pain by accelerating removal of pain-producing substances (Mischlovitis SL, 1986). In addition, Masuda A., et al., (2005) quoted “We found that thermal therapy improved quality of life by improving sleep quality and general well-being in patients with chronic heart failure (Tei C, et al, 1995)”. In the study Effects of Repeated Thermal Therapy for Patients with Chronic Pain, Masuda A., et al., (2005) stated “Furthermore, thermal therapy using far infrared rays have

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a sleep-enhancing effect (Honda K, Inoue S, 92-94)". In another study conducted by Matsushita K., Masuda A., and Tei C., (2008) on the Efficacy of Waon Therapy for Fibromyalgia they noted that "Waon Therapy" is defined as "therapy in which the entire body is warmed in an evenly heated dry chamber for 15 minutes at 60 degrees celcius that soothes the mind and body." They continue on to state that the deep body temperature increases approximately 1.0-1.2 degrees celcius (Matsushita K., Masuda A., and Tei C., 2008). Matsushita K., Masuda A., and Tei C., (2008) put forward that the temperature of 60 degrees celcius is lower than conventional saunas and obviating the discomfort from heat stimulation of sympathetic nervous systems (Tei C, et al., 1995).

Rattray F. and Ludwig L.,(2000) point out that for thousands of years, literature from all over the world has mentioned kneading, pressing, anointing or rubbing as a healing practice. They say the effects of massage are physiological and psychological in nature (Rattray F. and Ludwig L., 2000). The physiological effects are subdivided into mechanical effects – on adhesions and the vascular and lymphatic systems, for example – and its reflexive effects through the neurological systems – the central, peripheral and autonomic systems (Rattray F. and Ludwig L., 2000). Darabpour S., Kheirkhah M., Ghasemi E., (2016) suggest that massage increases the secretion of endorphins, dopamine, and serotonin, and reduces the levels of stress hormones, such as cortisol, epinephrine, and norepinephrine, which can reduce anxiety, fatigue, stress, and physical and mental strain. Rattray F., and Ludwig L.,(2000 p.10) state:

Generally, massage is recognized as effective in reducing or managing pain. Pain from nerve receptors in the body is processed in the spinal cord and travels to the brain – the thalamus and cortex – where it is modulated. The person's perception of pain can be partially controlled by signals transmitted from the cerebellum down the spinal cord.

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These signals inhibit pain signal transmissions at the level where they enter the spinal cord, decreasing the person's level of pain sensitivity.

They continue to state that all types of petrissage affect local circulation while they are being applied (Rattray F., and Ludwig L., 2000, p.25). Petrissage is from the French "petrir" meaning to knead. (Rattray F. and Ludwig L., 2000) Muscle hypertonicity is reduced with the repetitive kneading movements of petrissage (p 26). Petrissage, states Rattray F. and Ludwig L., (2000), can be soothing or stimulating depending on the speed and rhythm of its application. Generally, any technique applied in a slow, rhythmical and repetitive manner will evoke a relaxation response and decrease sympathetic nervous system firing (Rattray F., and Ludwig L., 2000)

Based on the condition and information presented, it is hypothesized that a combination of Infrared Sauna and full body Swedish massage provided one time a week for five weeks, will elicit relaxation, decrease pain and improve sleep in a patient with Fibromyalgia.

Methods

Patient History

The patient in this study was a 58 year old female who began noticing symptoms of Fibromyalgia (FM) three years ago. At the onset of her symptoms she was working as a Regional Sales Manager, responsible for 12 branches of an Architectural Design company. This was a high stress job with a considerable amount of responsibility that regularly included travelling. Just prior to this time, the patient had undergone surgery to repair the medial meniscus in her left knee and within a few days of the surgery had slipped on ice and re-tore the meniscus. In addition to this, the patient's sister had been very ill and passed away. This was a significant trigger for her due to the loss of both of her parents early on in her life. Keeping up with the demands and pressure to work harder because of the need to financially support herself, she found herself one morning upon awakening, completely unaware of her surroundings. She continued to feel disoriented and forgetful which preceded the pain symptoms and then exhaustion. When her employer discovered how ill she was, they released her from her job and thus she is currently retired.

At intake the patient reported that the symptoms she experiences due to fibromyalgia are currently better than when they first began and does not feel as though she is experiencing anxiety and depression at this time. However she does experience daily symptoms which she described as muscle and joint pain as well as fatigue with overexertion. The patient describes her pain as sore, achy and stiff. She also has high blood pressure (HBP) monitored by medication, sensitivity to light, tinnitus and persistent numbness and tingling in bilateral thighs and degeneration of her lumbar spine. To monitor her blood pressure she takes Ramipril, Amlodipine & Tylenol arthritis to control pain as well as Arnica and Boswelia gel for her back

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and knee. She was previously seeing a Physiotherapist (PT) for strengthening exercises in her knee but has ceased treatments. She receives adjustments from a Chiropractor one to two times a month for mobility. The patient also participates in deep-water aqua-fit three times a week and relaxes in the sauna or hot tub after swimming which she finds very helpful. Ice and cold are aggravating for her symptoms. At this time her sleep consists of only five to six hours a night and regularly wakes up throughout the night which leaves her feeling fatigued in the morning. It's also important to note that she uses a Continuous Positive Airway Pressure (CPAP) machine for Sleep Apnea. Currently the patient has reported she has low stress however she is still physically tired and sore.

Patient Observations found blood pressure to be 159/84mmHg with pulse at 74BPM at initial intake and assessment appointment. Patient has slight externally rotated feet bilaterally, hyperextension at the knees bilaterally, a moderate hypolordotic curve at the lumbar spine as well as moderately protracted scapulae with slight medial rotation bilaterally; right shoulder presented slightly higher than left.

Palpation also indicated that hypertonicity was present within Gastrocnemius and Soleus bilaterally; the lumbar Erector Spinae Group (ESG), Upper Trapezius, Supraspinatus, Scalene & Deltoid muscles which were also sensitive for the patient to have palpated. In addition hypertonicity was present in Levator Scapulae and SITS (Supraspinatus, Infraspinatus, Teres Minor and Subscapularis) muscles bilaterally. Proximal to the medial collateral ligament (MCL) of the knee was tender to touch; left side greater than right and pain just distal to the common extensor tendon of the forearms were painful bilaterally.

As noted above, patient experiences numbness and tingling in thighs bilaterally and describes it as persistent.

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Because range of motion was not a measurable goal within the study it was not utilized as an assessment tool.

Assessment

Patient was assessed for Fibromyalgia using the tender point method, as Rattray F., and Ludwig L., (2000) describes “There are 18 symmetrical tender points of which at least 11 need to be found on examination to confirm Fibromyalgia. Rattray F. and Ludwig L., (2000, p982) goes on to state that this distinguishes fibromyalgia from other conditions such as chronic fatigue syndrome, myofascial pain syndrome (trigger points), myalgic encephalomyelitis or various forms of arthritis and lupus. Control sites as stated by Rattray F., and Ludwig L., (2000 p.982) are at the forehead, the flexors of the fingers, the lateral epicondyle and the insertion of the deltoids should not be tender. Using this method on the patient the initial outcome resulted in 15 tender points out of a possible 18. The Left Deltoid muscle insertion as well as left finger flexors, which are considered to be control points were also tender upon palpation (review graph 9 in Results section).

Fibromyalgia symptoms were assessed using the Revised Fibromyalgia Impact Questionnaire (FIQ-R). The FIQ-R assesses the severity of patient’s symptoms over the previous seven days.

The 'time' dimension is the same as the FIQ; that is, all questions relate to the impact of FM over the course of the past 7 days. The scoring of the FIQR is much simpler than the FIQ: namely, the summed score for function (range 0 to 90) is divided by 3, the summed score for overall impact (range 0 to 20) is not changed, and the summed score for symptoms (range 0 to 100) is divided by 2. The total FIQR is the sum of the three

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modified domain scores. The weighting of these three domains is different from the FIQ in that 30% of the total score is ascribed to 'function' as opposed to 10% in the FIQ, 50% is ascribed to 'symptoms' as opposed to 70% in the FIQ, and 'overall impact' remains the same as the FIQ at 20%. The total maximal score of the FIQR remains the same as the FIQ, namely 100 (Bennett R M., et. al, 2009).

At intake and assessment the patient scored a 59.5 (See Graph 7). Full results can be found in Appendix section.

The McGill Pain Questionnaire was used to assess pain for the month prior to treatment and then once again after the month that treatment was received. This pain questionnaire assesses the pain experience via three different components, it assess the sensory, emotional and cognitive aspects of pain with the highest score being a 78 and the lowest score being 0. At initial intake and assessment patient scored a 52, indicating that pain is a significant factor (See Graph 8). Full results can be viewed in Appendix section.

The Pittsburgh Sleep Quality Index (PSQI) was used to assess the patients sleep for the month ahead of the study as well as right after the month that treatment was received. As indicated from instructions on the form “The following questions relate to your usual sleep habits during the past month only.” In addition to this, the scoring instructions are as follows: “The Pittsburgh sleep Quality Index (PSQI) contains 19 self-rated questions and 5 questions rated by the bed partner or roommate (if one is available). Only self-rated questions are included in the scoring. The 19 self-rated items are combined to form seven “component” scores, each of which has a range of 0-3 points. In all cases, a score of “0” indicates no difficulty, while a score of “3” indicates severe difficulty. The seven component scores are then added to yield one “global”

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score, with a range of 0-21 points, “0” indicating no difficulty and “21” indicating severe difficulties in all areas. Patient initially reported that it takes her 10-15 minutes to fall asleep, she wakes up a couple of times in the night and gets about five to six hours on average, of sleep per night. Her habitual sleep efficiency score was 71% which indicates her number of hours slept divided by the number of hours spent in bed. The patients “Global” score for sleep was 11 suggesting a moderate impairment of sleep (See Graph 8). Full results can be reviewed in the Appendix section.

Treatment

Treatment commenced over a period of five weeks beginning November 16, 2017 and ending on December 14, 2017. Once a week the patient received 15 minutes in the Infrared Sauna (IRS) at a reduced temperature of 140 degrees fahrenheit (60 degrees celcius) that was noted by Matsushita K., Masuda A., and Tei C., (2008) in their study on Efficacy of Waon Therapy for Fibromyalgia that a “far infrared-ray dry sauna maintained at a constant temperature of 60 degrees celcius, has been shown to be a safe form of therapy in patients with a compromised physical condition, such as those with heart failure (Tei C., et al., 1995)(Kihara T., et al., 2002)(Kihara T., et al., 2004).” Given that the patient was also presenting with hypertension, however, controlled, safety and careful consideration was imperative. After the 15 minutes in the Infrared Sauna blood pressure, pulse and Visual Analog Scale (VAS) were taken and then patient was treated with a 45 minute fully body Swedish massage. The majority of the time allotted to the Swedish massage was according to the palpated areas of hypertonicity and pain, most notably the patient’s back and neck however as much of the entire body was treated as possible in order to have a complete effect on circulation, relaxation and pain reduction.

Swedish massage techniques that were utilized consisted of effleurage, and petrissage, including stroking (palmar, knuckle & ulnar border), kneading, picking up, wringing and open C depending on the area of the body. Areas of the body treated were the back, neck, face, shoulders, arms, hands, legs and feet. A full example of techniques, and area of the body treated can be found in the management plan in the Appendix section. All techniques were applied in a slow rhythmical motion in the direction of the heart. The intention of treatment was to gently increase circulation and reduce hypertonicity to further decrease pain and the sympathetic branch of the autonomic nervous system. Patient was prone for 20 minutes and supine for 25 minutes of

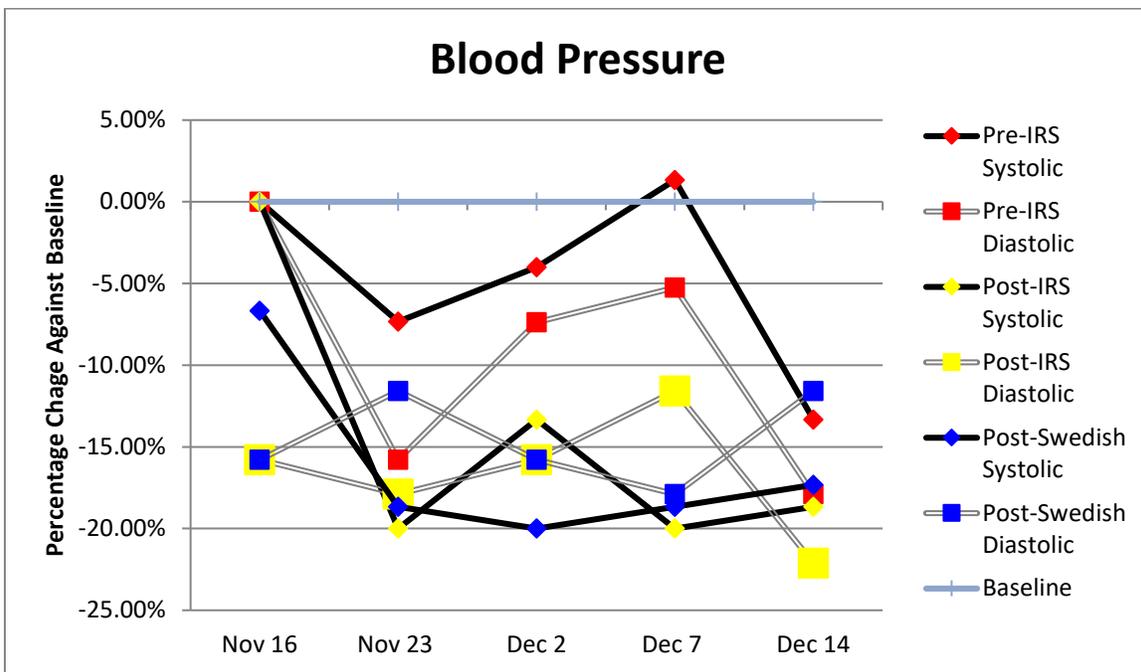
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each treatment. The use of one blanket, shoulder pillows, one pillow under legs and an eye drape were used throughout the duration of the treatments. The pain scale of 1-5 was introduced to the patient to utilize throughout treatments, pain scale being: 1= light touch 2= firm pressure 3= therapeutic pain that feels good, 4= pain that you can breathe through and 5= too much pain you need to stop. Pressure remained at about a 2 on the scale throughout treatment.

Goals monitored throughout treatment sessions were patient's pain experience using the Visual Analog Scale (VAS) where 0 = least amount of pain and 10 = most amount of pain, Blood pressure and pulse were taken pre and post Infrared Sauna and again after Swedish massage to assess the Autonomic Nervous System. In addition to this, at the end of each treatment the patient was sent home with a sleep journal that had her document her sleep throughout the week. The sleep journal addressed the time she went to bed, how long it took to fall asleep, how many times she woke up in the night, what time she woke up, how many hours of sleep and if she felt rested and pain upon awakening. The sleep Journal was brought back at the beginning of the subsequent treatment. See Appendix section for full details of sleep journals.

Results

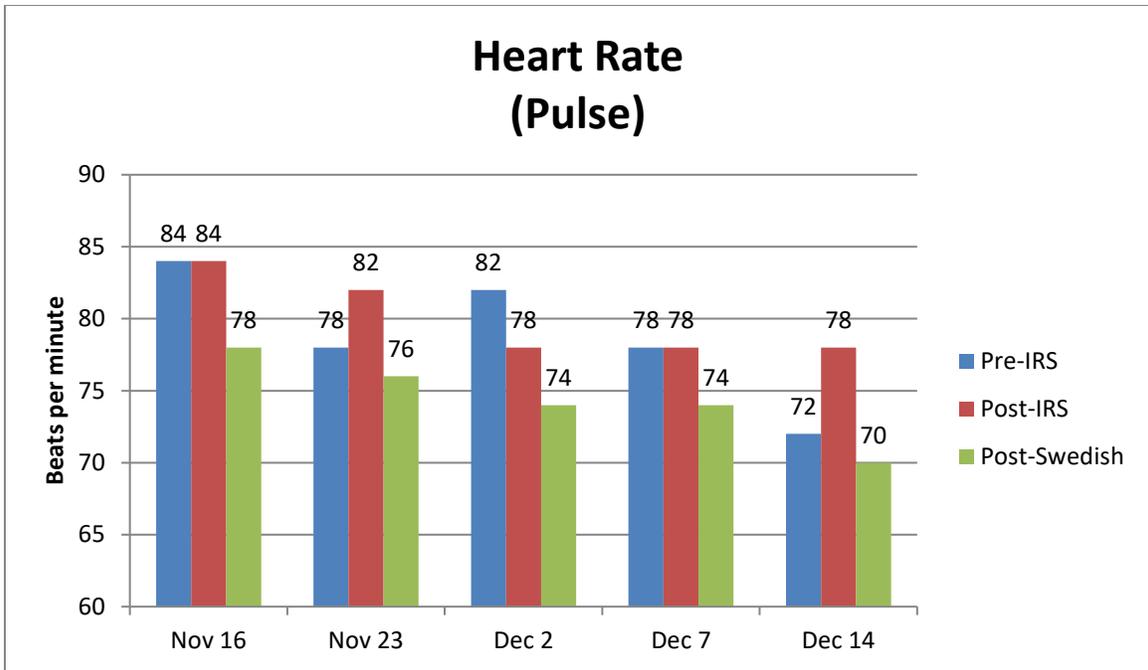
As demonstrated in the following graphs both IRS & Swedish massage had a positive impact on reducing the sympathetic branch of the autonomic nervous system, reducing pain, increasing sleep quantity by about one hour, decreasing the amount of times patient woke up in the night, and increasing restfulness upon awakening, most specifically the morning after treatment.



Graph 1

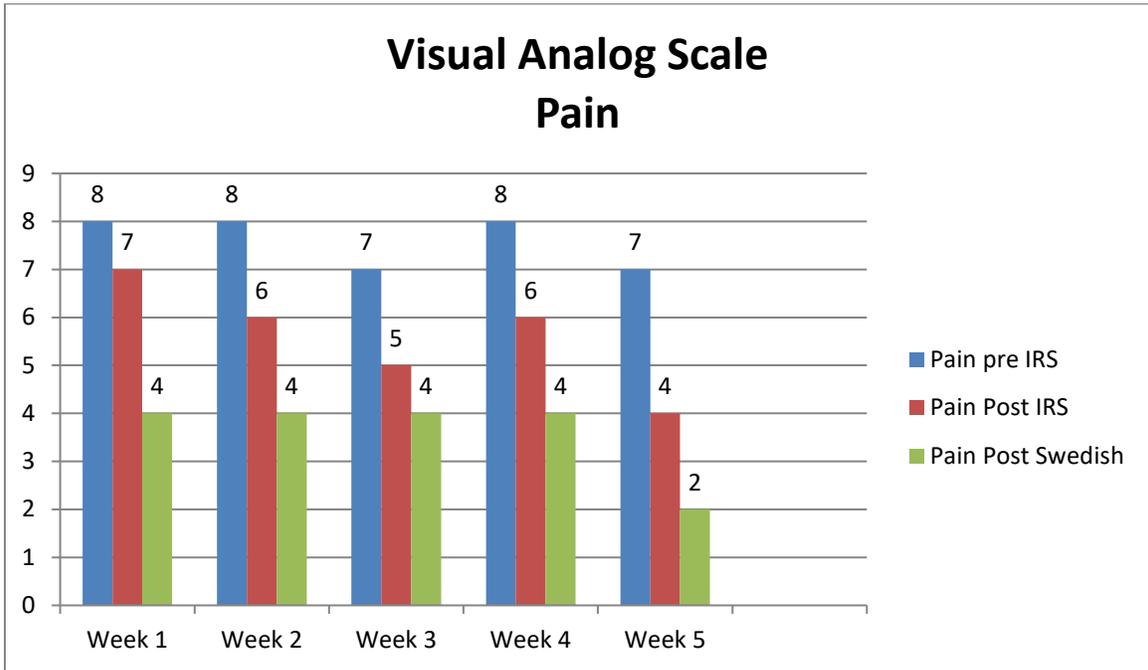
Blood pressure was taken pre and post IRS and Swedish massage. Graph indicates percentage of increase and/or decrease of both systolic and diastolic measures against baseline of first treatment.

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Graph 2

Heart rate was more significantly reduced post massage and typically either remained the same or increased slightly post IRS.



Graph 3

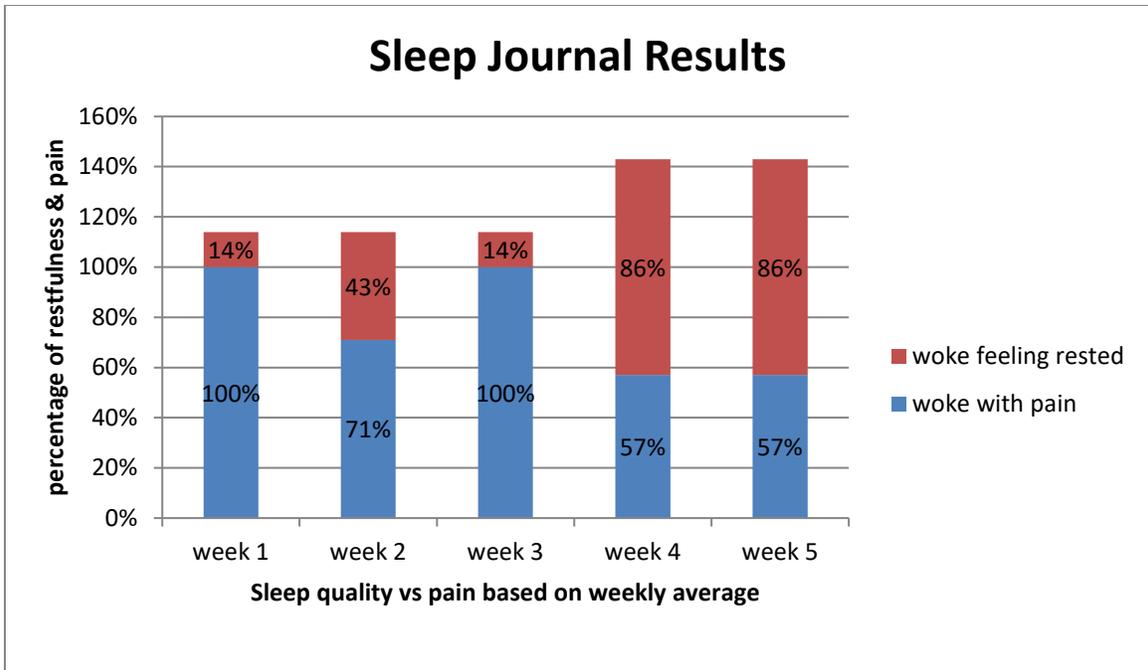
Patient's experience of pain post IRS and Swedish massage showed a consistent decline.

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Sleep Journal	Eve of/morning after treatment 1	Eve of/morning after treatment 2	Eve of/morning after treatment 3	Eve of/morning after treatment 4	Eve of/morning after treatment 5
How long did it take you to fall asleep?	10 mins	20-30 mins	10 mins	10 mins	30 mins
Did you wake feeling rested	Yes	Yes	Yes	Yes	Yes
Did you wake with pain	Yes	No	Minimal	No	No
How many hours of sleep	7	7	6.5	7.5	7
How many times did you wake up	2	1	1	0	1

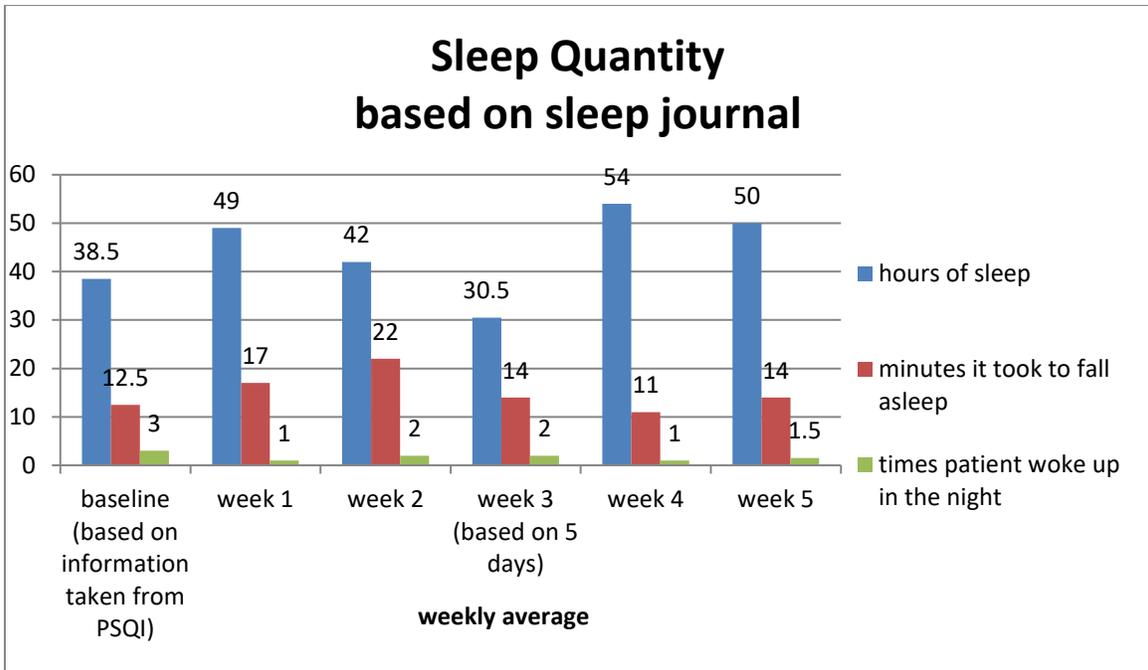
Graph 4

This is an example of what the sleep journal looked like for each night of the week for the five week duration. More specifically, this chart demonstrates quality and quantity of sleep the night of treatment and morning after. The following graphs will demonstrate additional results and more detailed examples of sleep journals can be found in the Appendix section.



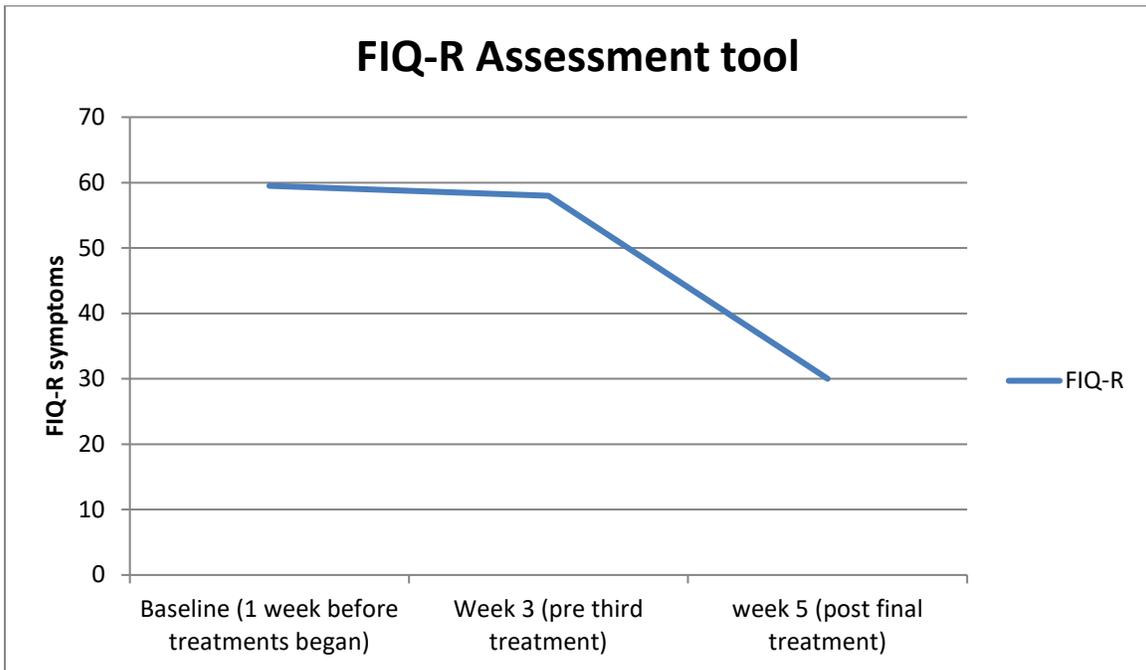
Graph 5

This graph shows patient's pain experience the morning after treatment against waking feeling rested. This was a compiled average of the duration of the week post treatment. The first week showed patient was waking with pain consistently and not feeling rested. Week two showed a decrease in pain and an increase in feeling rested. Week three was similar to the first week (see discussion for reasons why this may have occurred). Weeks four and five are where significant improvements began.



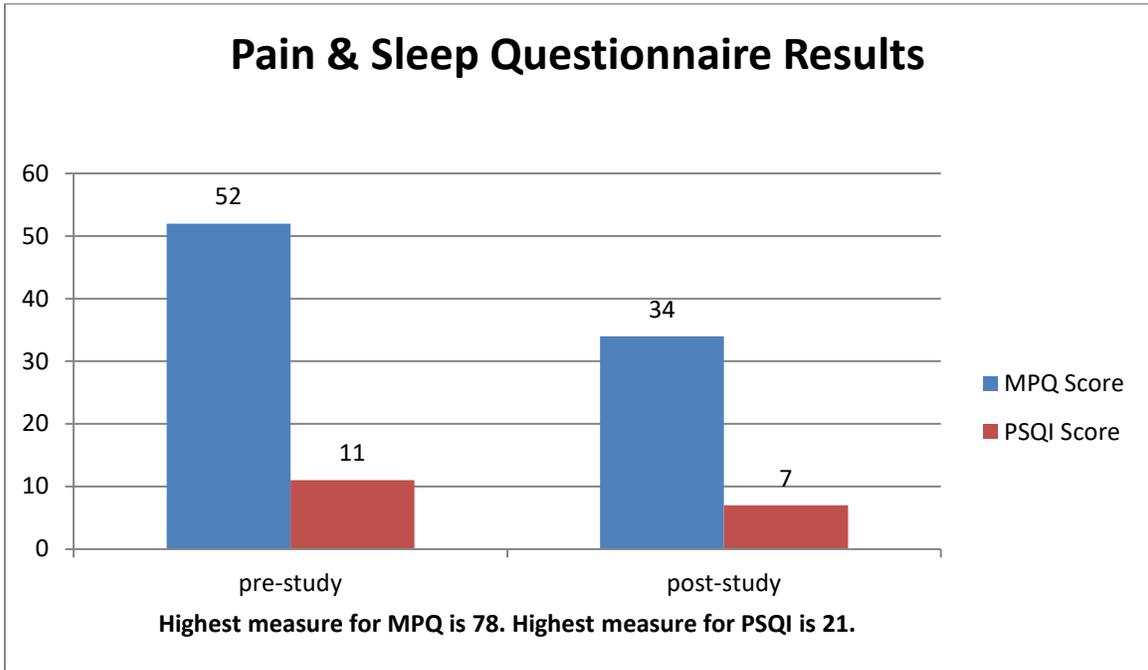
Graph 6

This graph displays a weekly average of how many hours of sleep patient got against how many minutes it took to fall asleep and how many times she woke up in the night.



Graph 7

FIQ-R assessments are based only on seven days prior. A slight change was noted midway through treatments. After the fifth treatment, there showed a significant improvement in fibromyalgia symptoms. See Appendix to review results in detail.



Graph 8

This graph identifies the beginning and end points of both patients experience with pain and sleep. The highest measureable outcome for pain using the MPQ is 78. Patient went from a 52 the month before treatments to a 34 right after treatments. Again the PSQI has their highest rating at 21; patient went from an 11 the month before treatment to a 7 right after treatments. More specific information can be found in the Appendix section.

Fibromyalgia Tender Points

	Pre-Initial Tx	Post-final Tx
1,2 - Sub-occipitals mm insertion	No Pain BL	No Pain BL
3,4 – UTs midpoint upper border	Pain BL	Pain BL
5,6 – Supraspinatus origin	Pain BL	Pain BL
7,8 – Gluteus medius (anterior)	Pain BL	No pain BL
9,10 – Gr. Trochanter (2cm post)	Pain BL R>L	No pain BL
11,12 - C5-C7 TVPs (anterior)	Pain BL	Pain BL (“very tender”)
13,14 – 2 nd rib (costochondral jn)	Pain BL	Pain BL (“very tender”)
15,16 – lat. Epicondyle (2cm dist)	Pain on L	No pain BL
17,18 – MCL @ knee (prox to jt)	Pain BL	Pain BL (“very tender”)
Control sites:		
Deltoid (mm insertion)	Pain on L	Pain BL
Forehead	No Pain	No pain
Lateral epicondyle	No pain	No Pain
Finger flexors (mm belly)	Patient felt tension, not pain	No Pain

Graph 9

This graph displays the tender points that were palpated both pre-study and again post-study.

Pre-study (15 tender points) and post-study (10 tender points), however some tender points the patient reported as “very tender” post study.

Discussion & Conclusion

Based on the results of this study it is reasonable to believe that a 15 minute Infrared Sauna treatment combined with a full body Swedish massage had an immediate positive impact on the reduction of the sympathetic nervous system and pain experience of the patient. In addition, there was an improvement in FIQ-R, MPQ, PSQI and Tender points palpated post study which is promising evidence that improvement was in fact made. However, for various reasons, it is believed by the therapist that weekly sleep journal was mostly inconclusive primarily based on researcher/therapist error for not conducting a sleep journal pre and post case study to fully examine the difference of both the qualitative and quantitative effects. This is an area as to which therapist would improve upon for a subsequent study. Secondly, assessment using the tender point method is currently outdated as research shows:

Hawkins R. A., (2013) explained that few primary care physicians perform tender point examinations (or correctly perform tender point examinations) (Bennet RM, 2009). The same can be said for many rheumatologists (Bennet RM, 2009). Additionally, the case definition of fibromyalgia has evolved in the past 20 years to include cognitive and other symptoms that are not included in the 1990 ACR criteria (Wolfe F, Clauw DJ, Fitzcharles MA et al., 2010.) Finally, tender points are highly correlated with psychological distress and are absent in as many as 25% of patients who have fibromyalgia (Bennet R M., 2009) (Yunas M B, Aldag J C, 2012).

Therapist would use more current evaluation of assessment in a subsequent case study within which proposed criteria do not require a tender point examination but rely on patient reports of widespread pain and other somatic symptoms (Hawkins R. A., 2013).

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There were several additional limitations to the study; some that could have potentially been controlled and others that could not. Areas to which therapist could not control was the increased stress and demand that was experienced by patient throughout the majority of the case study as she was preparing to put her house up for sale. During week one the patient reported feeling anxious upon arrival as it had been dark and raining; she had difficulty finding parking and was worried she might be late which may have been a result of increased blood pressure and heart rate results. In addition, the sleep journal results were slightly skewed given the fact that data was not fully obtained by the patient during week one. At the beginning of the second treatment, patient addressed that she had been doing extensive house cleaning such as vacuuming and washing floors over the week prior and thus she was feeling quite tense. Also there was an unforeseen interruption of the treatment schedule during week three that lead to only having accurate documentation of sleep for five out of seven days. During the third appointment patient expressed that she had been doing more cleaning, painting and prepping for the sale of her house over the week and in addition to this, she had been to see her chiropractor who did a myofascial release on her that increased her pain. It is also important to note that during this treatment was when patient provided therapist with documentation of her diagnosis of Fibromyalgia, which also clearly stated other comorbid conditions such as Myofascial Pain Syndrome, Chronic Fatigue Syndrome, Depression, Anxiety and Sleep Apnea as well as hypertension and suspected gallbladder disease, bilateral shoulder rotator cuff calcific tendinitis with mild acromio-clavicular joint degeneration, bilateral sensorineural hearing loss and bilateral hip osteoarthritis. As well, the patient brought in the results of a recent x-ray where it was noted that there are moderate to severe degenerative changes from lumbar vertebrae three (L3) to sacral vertebrae one (S1). Some of these conditions the therapist was aware of but several of them she was not and thus

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there is uncertainty as to what level of impact these conditions could have had and/or contributed to the pain experience. It is also important to mention that management plan had to be altered to reflect these conditions at a later date. At treatment number four, patient expressed that her symptoms felt flared up due to standing for several hours a day for about two to three days prior to treatment, as she was doing Christmas baking which aggravated her left knee. It was also noted that patient had just had a coffee on her way to treatment which could have been a contributing factor to the increase in blood pressure at commencement of treatment.

Variabilities that could have potentially been controlled by therapist and patient were that the patient resumed aquatic activities and other heated treatments such as hot tub and sauna throughout the five week duration of the study. Although the patient reported at the commencement of the study that she had already been doing these activities when baseline assessment for pain and sleep was conducted, it remains unclear whether or not these variabilities could have positively or negatively impacted the study. Patient having a treatment with a chiropractor could have also been avoided. The patient was using Tylenol arthritis as her only means of pharmaceutical intervention for pain management and thus it is unsure as to how much this may have impacted the results. In addition, the FIQ-R was utilized at initial intake, midway through treatments and once again at the end of the study. Because this questionnaire only assesses symptoms over the past 7 days, it would have been most effective to have implemented it on a weekly basis.

Patient's feedback after the first week's treatment indicated that she was waking up in the night from stiffness and back pain. This also happened to be the week she was beginning to prepare her home to put up for sale. After the second week of treatment patient expressed in the sleep journal that she slept very well the night of the treatment and stated that "The infrared

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sauna has a long lasting positive effect... I feel relaxed and the massage is very effective.” The third week, which is the week that appointment was rescheduled and so this week only consisted of measuring five days of rest and pain between the appointments, patient expressed “I am finding that massage is lasting me 2 days and I feel very rested and the pain is better...and then it begins to increase.” Patient also mentioned that “water is also very helpful and I am in a deep water class 3x a week... and have started going in the hot tub 10 minutes ... it helps.” Based on this information it is possible that including water treatments while participating in the study could have potentially altered the results. As Robert A. Hawkins (2013) discusses Aerobic exercise and muscle strength training can reverse deconditioning and improve sleep, pain, and function in patients with fibromyalgia (Carville SF et al, 2008), (Busch AJ, et al, 2008), (Sprott H, 2003). After the fourth treatment patient reported “Felt much better after the last treatment. I find the massage is very effective in releasing tension and this has a direct result in lowering my blood pressure and increasing sleep and much less pain.”

Because overexertion and increased stress on the body directly influence symptoms experienced by a patient with fibromyalgia it is increasingly challenging to control a study for someone who is essentially living their life; going through every day emotions and stressors that can impact the autonomic and central nervous system responses. As discussed in the introduction section, the stress response system can be very delicate to control thus patient’s feedback and analysis of her own experience is believed by therapist to be an important assessment.

In conclusion, it is important to recognize that each individual with fibromyalgia may present a little bit differently in terms of the severity of symptoms and aggravating factors they may experience, thus it is not reasonable to say that this type of treatment would work for all individuals with fibromyalgia. It is however, fair to state that treatments did positively impact the

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patient's pain and improve her sleep with even just one session per week. It is believed by the therapist that more than one treatment per week with a longer duration than five weeks would provide greater benefit and perhaps even longer lasting positive effects.

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Appendix

The following are photocopies of documents from the case study.