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Therapeutic Neuroscience Education for Patients with Chronic Low Back Pain and Its Effect on Activity Level, Pain Perception, and Function

Stephen Burton
University of Nevada, Las Vegas

Amber Domingo
University of Nevada, Las Vegas

Ryan Spencer
University of Nevada, Las Vegas

THERAPEUTIC NEUROSCIENCE EDUCATION FOR PATIENTS WITH CHRONIC LOW BACK PAIN AND ITS EFFECT ON ACTIVITY LEVEL, PAIN PERCEPTION, AND FUNCTION

By

Stephen Burton

Amber Domingo

Ryan Spencer

A doctoral project submitted in partial fulfillment

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We recommend the doctoral project prepared under our supervision by

Stephen Burton
Amber Domingo
Ryan Spencer

Entitled

Therapeutic Neuroscience Education for Patients with Chronic Low Back Pain and Its Effect on Activity Level, Pain Perception, and Function

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Robbin Hickman, D.Sc., Research Project Coordinator

Emilio Puentedura, Ph.D., Research Project Advisor

Merrill Landers, Ph.D., Chair, Department of Physical Therapy

Thomas Piechota, Ph.D., Interim Vice President for Research &
Dean of the Graduate College

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Abstract:
Background: Chronic low back pain (CLBP) is a significant cause of disability and inactivity in the United States. Patients with chronic pain are often symptomatic even in the absence of tissue damage. This is a major reason patients need to be educated about their pain. Cognitions such as fear, anxiety and faulty beliefs may impact the pain experiences and changing cognitions are important in changing pain behavior. If patients understand that the pain they are experiencing may not be a true indication of the health of their tissues, they may experience less fear of their pain, and may be able to return to previous activities.
Purpose: To determine if a one-hour one-on-one therapeutic neuroscience education (TNE) session for patients with CLBP would have a positive effect on their pain, perceptions, function, and activity level.
Subjects: Participants (2 males, 5 females mean age 38.3 years) who had been experiencing low back pain for >1 year and did not have a current exacerbation.
Methods: All participants attended a one-hour one-on-one TNE session where they were educated about their pain using drawings, examples, and metaphors. Activity, depression, pain, fear avoidance behaviors, knowledge of pain mechanisms, and perceived disability were assessed before and after the session for all participants. Pain pressure algometry and diagnostic ultrasound were also used to measure muscle sensitivity and lateral abdominal wall thickness.
Results: A Friedman's ANOVA was used for data analysis. A statistically significant change in pain level was found on a Visual Analog Scale (VAS) for

pain level today (p=.043), as well as the Fear Avoidance Belief Questionnaire-Physical Activity (FABQ-PA) subsection (p=.018). No other statistically significant changes were found.

Discussion: Patients with CLBP often alter their activity levels due to pain and fear of increasing their pain. This alteration in activity level can have a negative impact on patients' quality of life. With the intervention of a one-hour one-on-one TNE session participants had a significant decrease in pain levels and FABQ-PA scores. This decrease in both perceived pain and fear of their pain may increase physical activity, which could have a positive effect on patients' overall quality of life.

Conclusion: A one-hour one-on-one TNE session may be beneficial for patients with CLBP to decrease their pain level as well as decrease their fear of physical activity.

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Introduction

Chronic low back pain (CLBP) is a leading cause of inactivity in adults, and greatly decreases quality of life. As many as 70 to 80% of people will experience low back pain (LBP) at some point in their lives, and as many as 54 million Americans have experienced LBP in the last three months.[1, 2] Only 4.6 to 8.8% of patients with low back pain develop chronic pain, yet they account for 70 to 85% of the total cost associated with back pain.[3] An examination of medical expenditures in 1998 showed that the annual medical expenditures for back pain were $91 billion.[4] CLBP is a key component of the staggering sum. LBP accounts for 149 million lost days of work and 101.8 million of those were from work related injuries.[3] A systematic review showed that the productivity lost totaled $4.6 billion.[5] These overwhelming costs show a need to develop a treatment that would be effective at decreasing disability, increasing function, and increasing quality of life for patients with LBP. A study by Gatchel et al[6] demonstrated that an effective early intervention program significantly decreases the costs associated with LBP as well as the development of CLBP.

Patients with CLBP are often afraid of re-injuring themselves, so they avoid behaviors that they fear will exacerbate their condition.[7] They often adversely modify their posture and decrease their participation in activities.[8] Participation modifications are especially detrimental to people with CLBP. It has consequences in all aspects of their lives including physical health, mental health and social health. It has been shown that 98% of patients who suffer from CLBP also may be afflicted with depression, followed by substance abuse and anxiety

disorders.[9] Therefore, it is important for providers to educate patients about their pain. If patients know where their pain comes from they might not avoid participating in activities that bring them enjoyment.

There are many proposals about chronic pain and why patients perceive pain when there is no threat of tissue damage. One proposal regarding the negative effects of pain is that the central nervous system's (CNS) processing of pain becomes hypersensitive.[10] This hypersensitivity of the CNS (central sensitization) can become a source of persistent pain with or without input from the tissues from the affected area.[11] The longer pain persists, the more sensitive to an input stimulus the patient becomes. The patient with chronic pain experiences more pain as a result of noxious as well as non-noxious stimuli.[10] The patient develops not only increased fear with increased sensitivity to various stimuli which would not routinely hurt, but also a false assessment of the health of their tissues. Prior to engaging in physical activity and exercise, it is proposed that educational strategies aimed at changing the patient's beliefs and perception regarding their pain is warranted.

New research, utilizing therapeutic neuroscience education (TNE) has shown it to alter cognitions, decrease fear, increase physical movement and change patient's perceptions regarding their pain state.[12] TNE aims to increase a patient's understanding of the biology and physiology underpinning their pain state, rather than focus on anatomical and structural issues of the tissues.[12] In order to improve the well-being of patients with CLBP, healthcare providers need

to make sure they are made aware that although patients may be experiencing pain it may not be a result of tissue damage.

There have been studies that show education regarding pain is effective.[13-17] One such study done by Buchbinder et al[13] implemented a wide-spread media campaign designed to revise the general population beliefs about back pain. After this population-based campaign had completed, they showed that disability claims had decreased and people had an improved perception of back pain. It also showed that the physicians involved had a more positive outlook on LBP. Buchbinder et al[14] did a follow up study three years after the campaign had finished and found that the effects of the education had remained. Unlike other typical interventions for LBP, where the relief may not last when treatment is discontinued, education may have a positive long-term effect on the patient that may remain for several years.[14]

Moseley[10, 15-17] has completed several studies in which he employed the use of a TNE session in a one-on-one format. One case study involved a patient who suffered from disabling CLBP. Utilizing functional Magnetic Resonance Imaging (fMRI) while the patient performed an abdominal drawing in task, the patient's brain activity was measured twice before the TNE session during an abdominal drawing in maneuver, and it showed activity to be very high in the cortex.[15] The scan taken immediately after the TNE session revealed a marked reduction in cortical activity. Moseley[16] completed another study in which he employed a three-hour-long education session for patients who had been seen at outpatient clinics for three years and had been experiencing CLBP for the past

four months. The results showed that there was a significant positive change in pain attitudes and beliefs, as well as improved performance in straight leg raise and forward bending tasks. This result was also shown in a randomized controlled trial by Moseley et al[17] in which he compared a TNE session to an education session pertaining to the anatomy and physiology of the back. The study also demonstrated that the education regarding anatomy had an adverse effect on pain perceptions and function. Taken together, these studies offer preliminary evidence that educating patients with chronic pain may have a positive effect on their perception and beliefs about pain, as well as improved function.[12]

The purpose of this study was to determine if a one-hour one-on-one TNE session for patients with CLBP would have a positive effect on their pain perceptions, function, and activity level. This study is different from previous studies because it tested a one-hour one-on-one TNE session, which could be easily incorporated into a clinical setting in addition to traditional therapy.

Methods

Participants:

Participants were volunteers recruited from private physical therapy clinics in Las Vegas and Henderson as well as with the use of flyers circulated around the University of Nevada, Las Vegas (UNLV) campus and its surrounding vicinity. Volunteers were accepted into the study if they had experienced CLBP for greater than one year and they were over 18 years of age. Participants who indicated that they were currently experiencing exacerbation of their LBP were excluded from the study. Informed consent was obtained from all participants who met the inclusion and exclusion criteria before their participation in the study. All participants attended a one-hour one-on-one TNE session administered by physical therapists that were trained and experienced in providing the TNE session. The content of the session was the same for all participants, but the stories and metaphors used for each participant were personalized to fit with each participant's personal pain experience. All seven participants who entered the study completed it.

Overall study design:

This study was an interrupted, time-series design. Participants were tested twice before the intervention and twice after the intervention (Figure 1). All outcome variables were tested at each of the measurement times. The TNE intervention consisted of educating the participant about their pain using

analogies, pictures, examples, and metaphors tailored to each participant's individual experience with pain.

Procedure:

Participants came to the UNLV campus on three separate occasions over a two-week time period. During the first visit, each patient completed a series of nine questionnaires including: demographic questionnaire, Visual Analog Scale (VAS) to measure pain level, Fear Avoidance Belief Questionnaire (FABQ), Pain Catastrophizing Scale (PCS), Beck Depression Index (BDI), Oswestry Disability Index (ODI), International Physical Activity Questionnaire (IPAQ), Pain Self Efficacy Questionnaire (PSEQ), and Neurophysiology of Pain Questionnaire (NPQ). Four physical tests were also conducted. Pain pressure algometry (PPA) was performed on T12, L/R multifidus, most painful, and non-painful areas. Ultrasound imaging was used to measure the thickness of transversus abdominis (TrA). Heart rate and blood pressure were measured. At the end of the first session, the participants were given an activity monitor to wear continuously for one week and it was only to be removed for showering. After each participant had worn the activity monitor for one week they returned to the UNLV campus and completed the questionnaires listed above for a second time, excluding the demographic questionnaire. The previously mentioned physical tests were also conducted a second time. After the participants completed the tests they received the one-hour one-on-one TNE session where participants learned the mechanisms behind pain. Immediately after the TNE session, each participant completed the same questionnaires and tests as before the session.

Each participant was once again given the activity monitor to wear for a second week in the same manner as previously mentioned. After the second week of wearing the activity monitor, each participant returned to UNLV to complete the aforementioned questionnaires again, and the four physical tests were conducted one final time.

Outcome Measures:

At each of the testing periods participants completed a number of questionnaires and physical measures regarding their pain levels, disability, fear avoidance behavior, and depression. These included VAS, NPQ, PPA, FABQ, PCS, BDI, ODI, IPAQ, and PSEQ. Four physical tests were conducted including: PPA, diagnostic ultrasound to obtain thickness measurement of transversus abdominis, heart rate and blood pressure.

Activity levels were measured using activPAL[1] monitor. Each participant's activity levels were recorded on the device twice, one week before the TNE session and one week after the session. Activity monitors were found to be a reliable and valid measure of outdoor activity level and to be moderately reliable for self-paced indoor floor walking. [18,19]

The VAS was used to assess the participants perceived pain levels. It is an 11-point scale from 0-10, with 0 being no pain and 10 being the worst pain imaginable. The VAS has been shown to be a valid and reliable method for patients to rate the intensity and degree of their pain. [20]

[*] PAL Technologies Ltd, 141 St James Road, Glasgow G4 0LT, United Kingdom, telephone number: +44 (0) 141 552 6085

Psychological questionnaires were used to determine the participant's beliefs about their pain. The FABQ is a questionnaire used to quantify the participant's fear and beliefs of pain. It has been found that there is a strong correlation between fear avoidance beliefs and self-reported disability.[21] The BDI is a questionnaire used to assess the presence of depression. It has been shown to significantly discriminate between patients with and without major depression.[22] The PCS was developed to determine a patient's fear of pain and their ability to cope with pain. It has been shown that there is a significant relationship between pain catastrophizing and physical and emotional distress.[23]

Additional questionnaires were used to assess patient's coping strategies, self-monitored physical activity levels, functional limitations, and knowledge of pain neurobiology. The PSEQ is used to determine perceived self-efficacy for patients coping with chronic pain. This questionnaire may help determine the role of cognitive factors in developing chronic pain.[24] The IPAQ was developed to assess physical activity and inactivity in persons across different countries. It was found to have reasonable reliability and validity.[25] The ODI is a questionnaire used to assess aspects of physical function. It has been determined to have high re-test reliability, as well as acceptable internal consistency.[26] The NPQ was developed to assess a person's knowledge of pain neurobiology.

Along with the questionnaires, four physical tests were performed. The thickness of the lateral abdominal wall muscles were measured utilizing a Biosound My-Lab 25 Gold diagnostic ultrasound device [*]. It has been shown that

* MSK ultrasound 206 N Shelmore blvd, mount pleasant, SC 29464 Phone: 732.245.0091

diagnostic ultrasound is a valid way to measure trunk muscle size and activation.[27] PPA was also used to determine pain pressure sensitivity of areas commonly tender for each participant. PPA has been shown to have excellent reliability.[28] Heart rate and blood pressure were also measured.

Data analysis:

This study was a time-series design. All statistical analyses were performed using PASW version 18^. To answer the research questions, we conducted two different analyses:

1. A nonparametric (Friedman's) ANOVA (time: pre1, pre2, post1, post2) was used to assess the changes in scores across the following dependent variables: VAS, PPA, FABQ, PCS, BDI, ODI, PSEQ, and
2. A 2 (contraction state: contracted and rested) X 4 (time: pre1, pre2, post1, post2) nonparametric ANOVA with repeated measures on both factors was used to assess TrA thickness.

^ SPSS Inc.233 S. Wacker Drive, 11th Floor, Chicago, IL 60606

Results

Seven participants (two males and five females) volunteered for and completed the study. Demographics of subjects are outlined in Table 1. A Friedman's ANOVA was run in place of a repeated measures ANOVA due to the small sample size. Statistically significant changes were broken down further using Wilcoxon Signed Ranked test. Table 2 shows mean and standard deviations for outcome measures included in Freidman's ANOVA.

Results of VAS representing their amount of pain within the past 30 days, one line each for best, worst, and today is represented in Figure 2. It was found there was a statistically significant change in pain level as marked on VAS for pain level today only (p=.043).

The results of psychological questionnaires including FABQ – work, FABQ-PA, PCS, and BDI were graphed together and shown in Figure 3. There was found to be a statistically significant difference for the FABQ-PA subsection only (p=.018).

The results of ODI and PSEQ are represented in Figure 4 and 5 respectively, no statistical significance was found for either. No statistically significant difference was shown for PPA or TrA.

There was a technical malfunction with the activPAL monitors making the data unusable.

Bar graphs were used to show individual patient changes over time for VAS, FABQ-PA, FABQ-work, PCS, BDI, ODI, PSEQ. Figure 6-12 respectively.

Discussion

A one-hour one-on-one TNE session may be beneficial for patients with CLBP to decrease their fear of physical activity. This study focused on using a one-hour one-on-one TNE session that can easily be incorporated into a physical therapy treatment session for patients with CLBP. With the one-on-one TNE session the clinician is able to tailor the education provided to each patient on an individual basis. The specific approach used in the education session focused on explaining pain and the mechanisms of pain production using examples, pictures, and metaphors. The instructor is able to take a patient's personal history and experiences to individualize the education provided. This one-on-one approach has been found to be more beneficial when compared to group education sessions.[12]

There is no doubt that patients with chronic pain perceive pain that is real to them, and it is important to educate them on the difference between nociceptive input and the output of pain.[12] A person may experience pain without having any danger of tissue damage because their CNS has become hypersensitive. [29] Patients are taught the difference between nociceptive input and pain output during the TNE session. Patients are equipped with the knowledge that these two ideas are distinct and not related. Louw et al[12] proposed that if patients know nociceptive input and pain output are not related, a patient may not perceive nociceptive inputs as a threat and thus not experience as much pain.[12]

Patients who experience chronic pain often suffer from increased anxiety, fear, and sleep problems.[30] People with chronic pain limit time spent doing certain activities or they may actively avoid physical activities because they fear that their pain will be increased as a result of those activities. Patients often associate pain with tissue damage, and thus think that pain is causing them increased harm.[12] This thinking results in patients becoming less active and avoiding activities.[30] Because of this activity avoidance and limitation of certain activities, these patients may not be able to continue or return to the lifestyle they enjoy. If their pain level is decreased, a person may be more likely to remain active and have a lifestyle they can enjoy without limiting participation. This study showed that participants had a significant decrease on the VAS for "pain today." This decrease in perceived pain has the potential to have a positive effect in the participant's quality of life.

Although there was no statistical significant difference in participants' physical activity level, a significant decrease in the FABQ – PA scores were identified. It is important to note that having decreased fear of physical activity may have a positive effect on pain level. This suggests patients who receive one-on-one TNE may become more physically active in the future. This could also result in participants returning to sports and activities they enjoy without fear of increasing their pain level.

A downward trend in the PCS scores was seen, but it was not found to be statistically significant. Patients who catastrophize focus much of their attention on their pain.[31] This attention to their pain may actually increase their symptoms

due to an increased sensitivity of the CNS.[32] If a patient focuses less attention on their pain there may be an associated decrease in patient's pain experience, which could have a positive effect on a patient's quality of life.

This study showed a one-hour one-on-one TNE session was effective at decreasing participants' pain level and their fear of physical activity. The scores on the PCS were trending downward and with a larger sample size this may have been shown to be significant. In future studies involving the one-hour one-on-one TNE session, it will be important to have a larger sample size to increase power to allow an increased ability to show significant changes. Future research should have a longer term follow up, such as a one-month or three-month follow up to track any lasting effects of the TNE session.

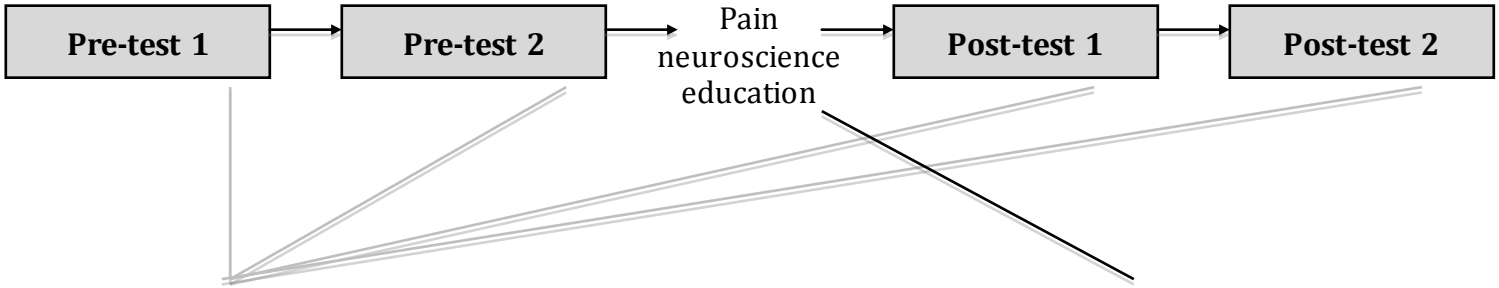
Limitations:

This study was not without its limitations. It was a pilot study, therefore the sample size was small and underpowered. One outcome measure was trending downward but due to lack of power no statistical significance was reached. The activPAL monitors malfunctioned with nearly all participants during one of the week time frames resulting in the data not being collected and thus not having that data to analyze. There were problems with participant compliance wearing the activPAL monitors for the week time frame resulting in no data to use for analyzing. Because of these malfunctions and noncompliance it was not possible to determine the effect the education session had on participant's physical activity level.

Conclusion

Overall, this study shows benefits for incorporating TNE into the treatment of patients with CLBP. It was shown to significantly decrease pain level and fear of physical activity. Both of those findings have the potential to increase a patient's quality of life.

Figure 1. Overall study design



Pain profile
- Pain Visual Analog Scale (VAS)
- Pain Pressure Algometry (PPA)
- Neurophysiology of Pain Questionnaire

Psychological profile
- Pain Catastrophizing Scale (PCS)
- Pain Self-Efficacy Questionnaire (PSEQ)
- Beck Depression Inventory (BDI)
- Fear-Avoidance Beliefs Questionnaire (FABQ)

Activity and participation profile
- Oswestry Disability Index (ODI)
- International Physical Activity Questionnaire (IPAQ)
- Weekly activity levels measured by activPAL activity monitor

Motor control profile
- Transversus abdominis muscle thickness

Pain neuroscience educational elements (Puentedura 2010)
- Pain does not provide a measure of the state of the tissues
  - Repaired tissues need to be loaded
  - Some degree of stress is important for normal health of biological tissues
- Pain can be affected or modulated by many factors besides movement and biomechanics
  - Psychological aspects
  - Social aspects
  - Attention and expectation aspects
  - Contextual aspects
- Relationship between pain and the state of the tissues becomes less predictable as pain persists
  - Nociception
  - Sensitization
  - Graded exposure of activity as a means to desensitize nociceptive input
- Pain can be conceptualized as a conscious correlate of the implicit perception that tissue is in danger
  - Neuromatrix theory
  - Conceptualization of pain as an output of the central nervous system when tissues are perceived to be under threat
  - Perception of threat

Appendix:

Table 1: Descriptive Statistics

(n= 7)	Minimum	Maximum	Mean
Height (in)	64	75	67.357
Mass (lbs)	135	178	163.85
Age(yrs)	21	64	38.28

	Category	N
Gender	Male	2
	Female	5
Race/Ethnicity	White	4
	Asian/Pacific Islander	1
	Hispanic	1
	Other	1

Table 2: Mean and standard deviation

Variable	Pre test 1	Pre test 2	Post test 1	Post test 2
VAS today	4.41 (2.44)	5.63 (2.82)	5.61 (2.84)	2.91 (2.13)
VAS worst	8.60 (1.08)	7.79 (2.09)	7.50 (2.04)	7.04 (2.26)
VAS best	2.80 (1.83)	3.23 (2.56)	2.33 (1.62)	2.63 (1.76)
FABQ – work	14.57 (13.25)	11.57 (11.67)	11.00 (8.21)	9.86 (13.06)
FABQ – PA	15.14 (6.89)	14.43 (7.12)	11.14 (5.82)	11.43 (6.11)
PCS	15.71 (9.69)	13.14 (6.31)	9.86 (2.73)	8.71 (2.50)
BDI	9.00 (6.11)	8.29 (6.13)	8.43 (6.11)	8.57 (7.37)
PSE	45.14 (9.10)	45.71 (12.35)	49.00 (5.66)	45.14 (11.95)
ODI	20.86 (8.69)	20.14 (10.34)	19.29 (8.32)	19.43 (11.16)
TrA Rest	0.34 (0.14)	0.34 (0.17)	0.35 (0.19)	0.29 (0.14)
TrA Contracted	0.46 (0.11)	0.41 (0.16)	0.44 (0.16)	0.47 (0.13)
PPA T12	9.13 (6.26)	9.68 (5.82)	11.31 (6.85)	10.82 (6.67)
PPA Multifidus	7.83 (4.84)	12.16 (8.76)	12.08 (7.38)	10.90 (7.21)
PPA Most Painful	8.15 (4.69)	11.25 (7.62)	12.09 (8.77)	11.99 (6.74)
PPA Non-painful	11.25 (7.85)	10.54 (7.96)	12.30 (11.67)	10.49 (9.38)

Figure 2: VAS graphed over time for today, worst, and best. Pain today was found to have a statistically significant decrease.

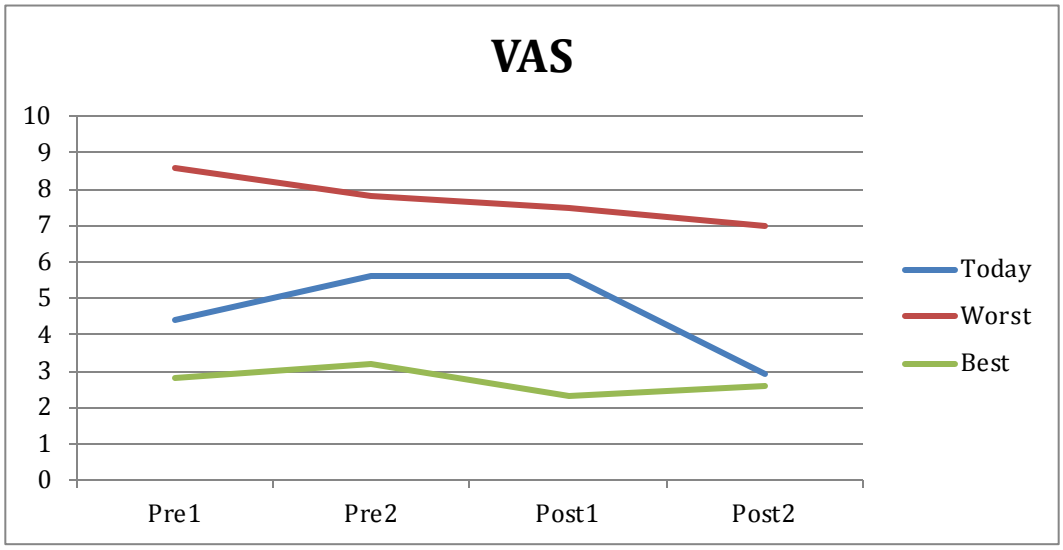


Figure 3: Questionnaires with psychological aspects graphed over time. Scores for FABQ-PA were found to have a statistically significant decrease. No other statistically significant changes were found.

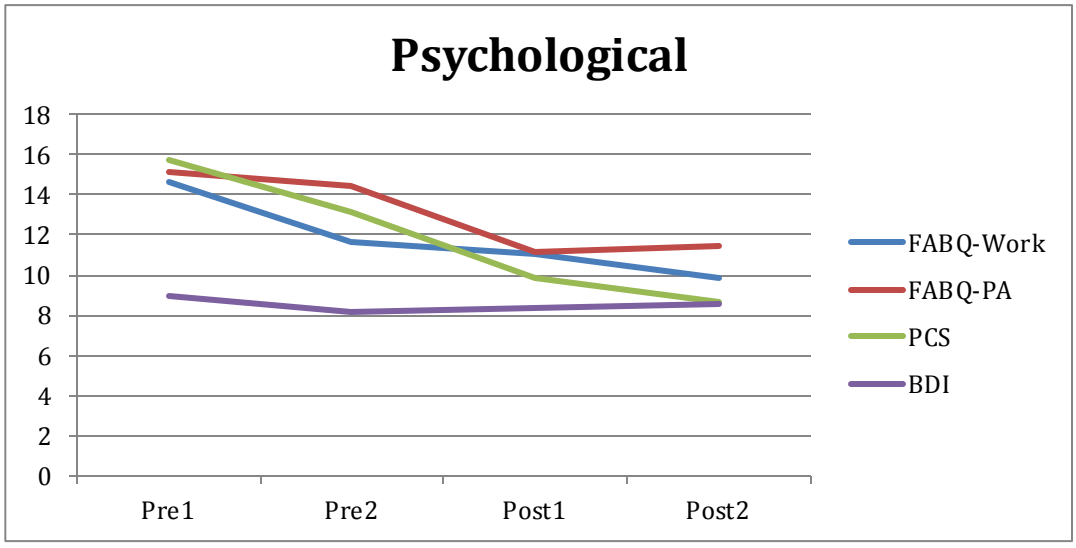


Figure 4: Oswestry Disability Index graphed over time, no statistical significant change was found.

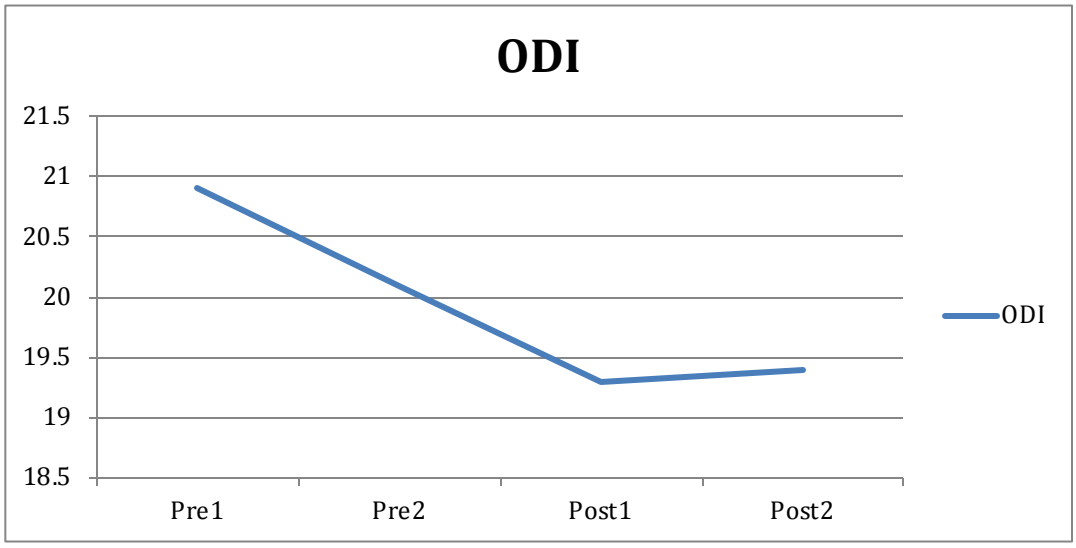


Figure 5: Pain Self-Efficacy Scale graphed over time, no statistically significant change was found.

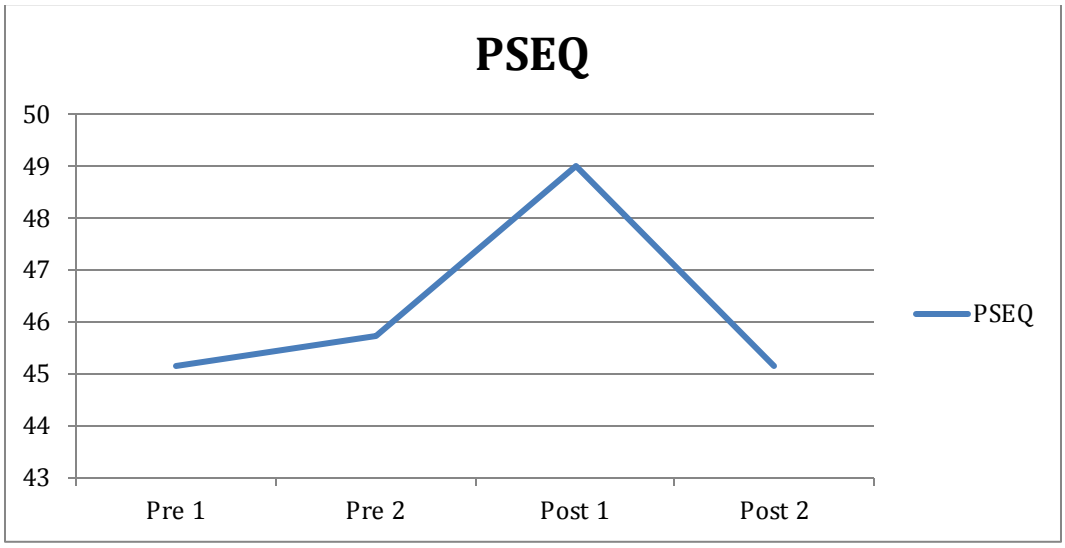


Figure 6: VAS-today graphed to show individual patient change over time.

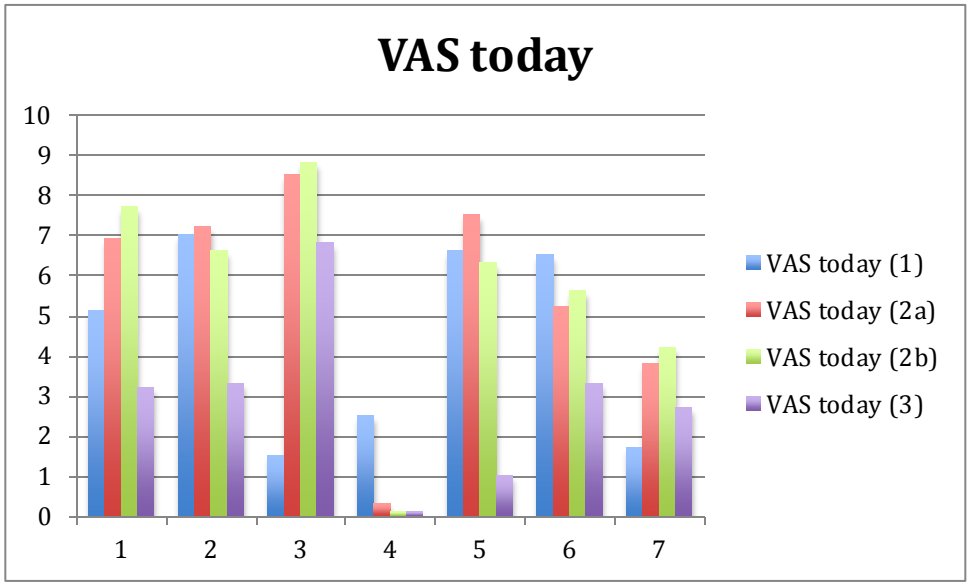


Figure 7: FABQ-PA graphed to show individual patient change over time.

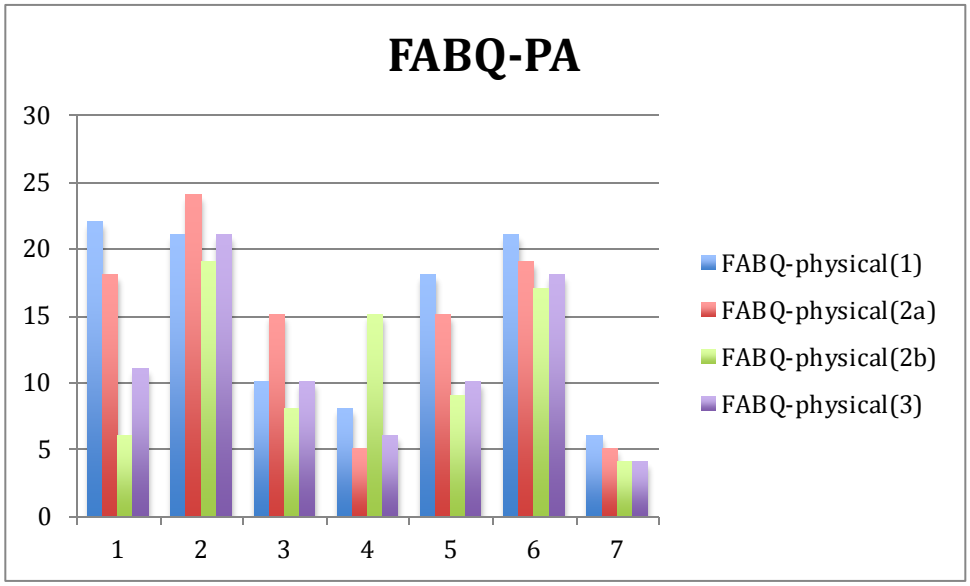


Figure 8: FABQ-work graphed to show individual patient change over time.

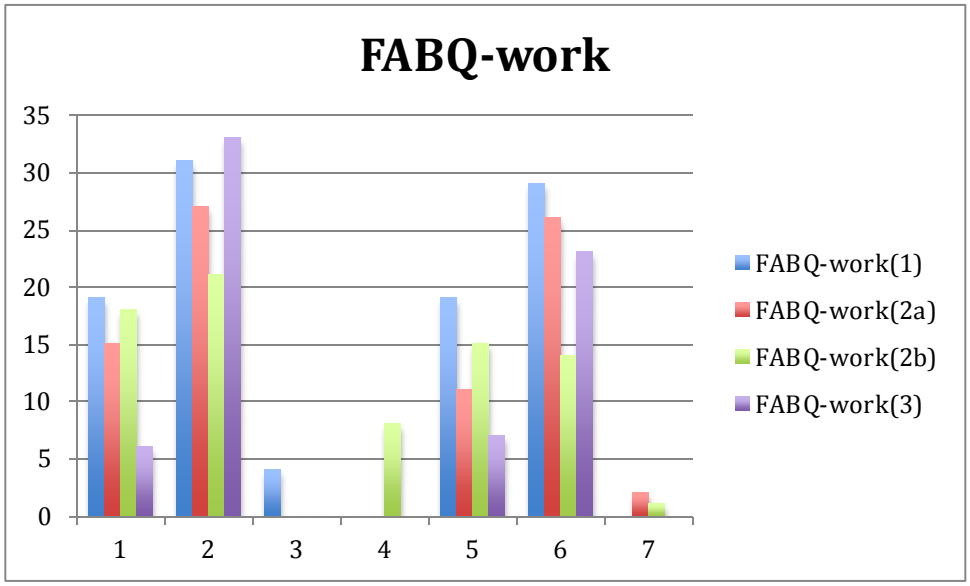


Figure 9: PCS graphed to show individual patient change over time.

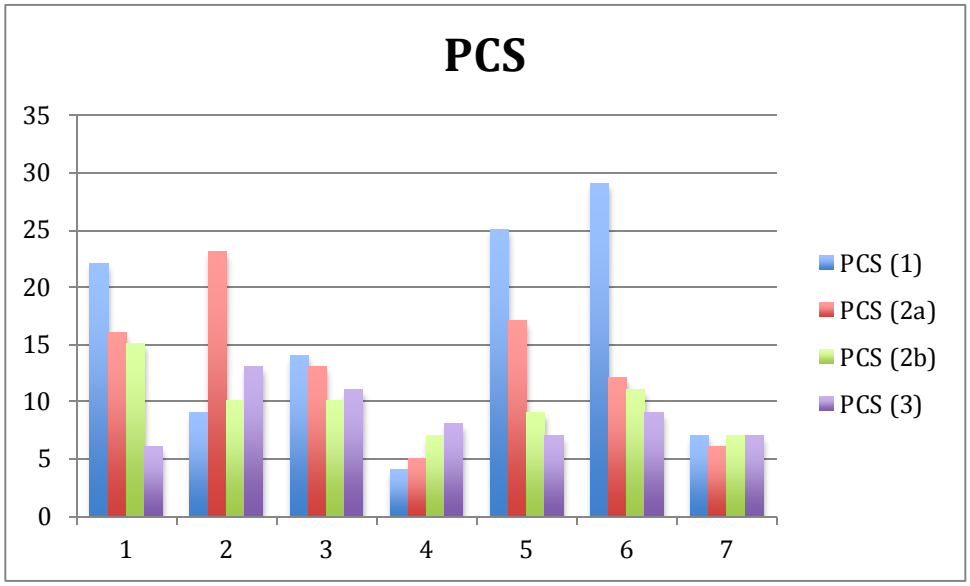


Figure 10: BDI graphed to show individual patient change over time.

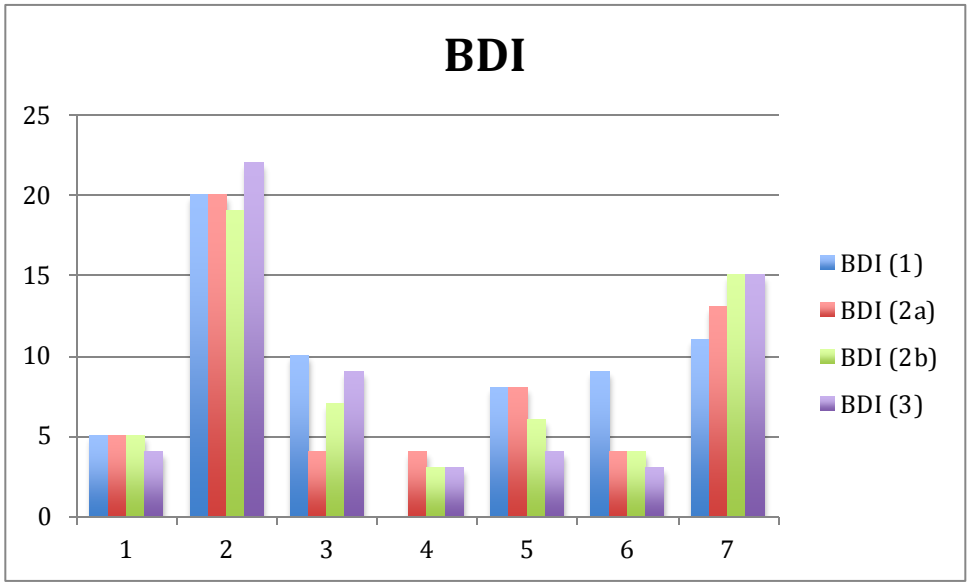


Figure 11: ODI graphed to show individual patient change over time.

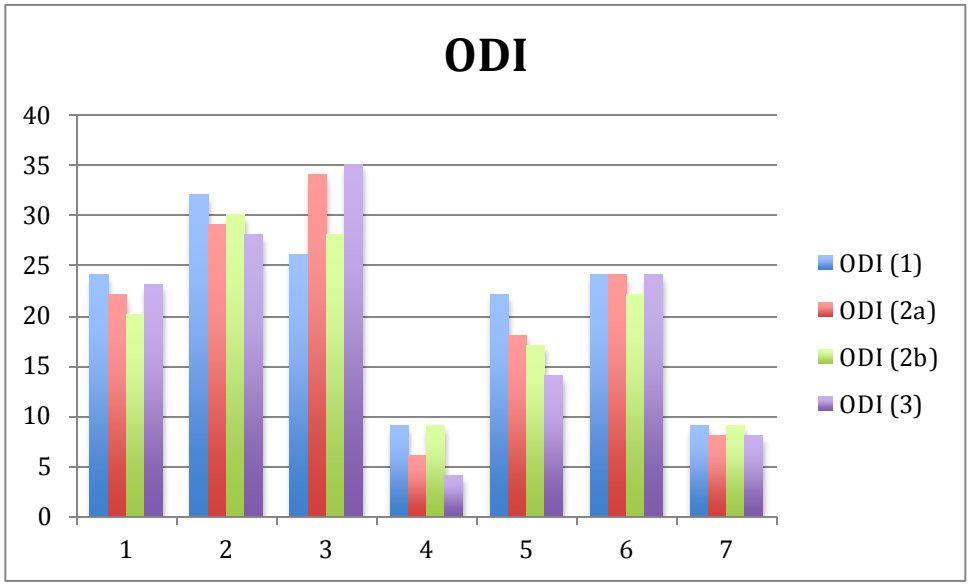
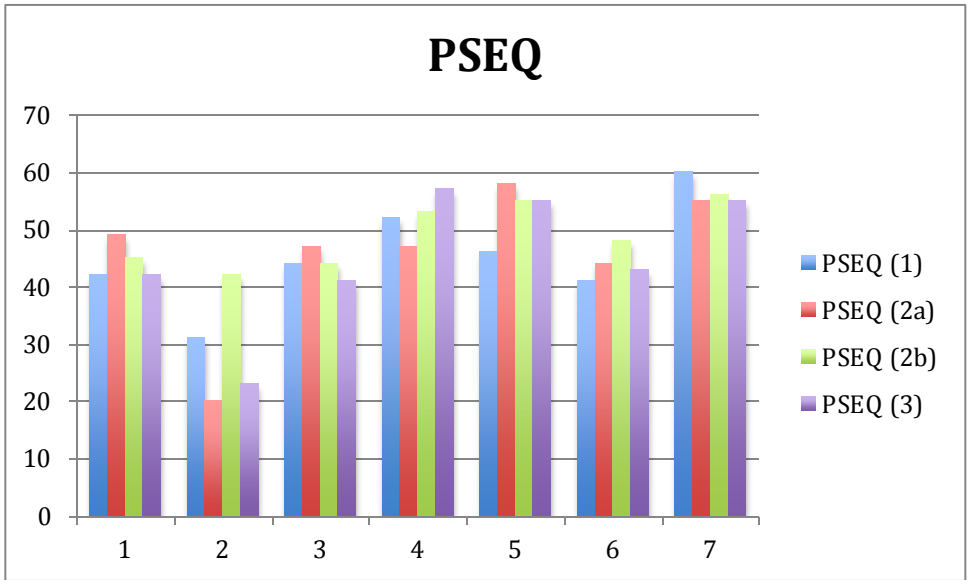


Figure 12: PSEQ graphed to show individual patient change over time.



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Stephen A. Burton, SPT

841 East 475 North, American Fork, UT 84003
801-319-8842, stephenaburton@hotmail.com
Washington PT License: Pending

Education:

- Doctorate of Physical Therapy
    - University of Nevada Las Vegas
        - (May 2013)

- Bachelor of Science: Exercise Science
    - Utah Valley University
        - (August 2009)
    - Graduated Cum Laude

Clinical Rotation Experience:

- Sunrise Hospital and Medical Center, Las Vegas, NV
    - (January 2013-April 2013)
        - Rehab Setting
        - Evaluated and treated patients with long-term orthopedic and neurological conditions

- Providence St. Peter Hospital, Olympia, WA
    - (October 2012-December 2012)
        - Acute Care Setting
        - Managed and treated various aspects of patients in an acute care setting

- Corvallis Sports and Spine PT, Corvallis, OR
    - (July 2012-October 2012)
        - Orthopedic Outpatient Setting
        - Evaluated and treated patients dealing with a vast array of conditions, mostly focusing on musculoskeletal conditions

- Professional Physical Therapy and Sports Medicine, Orem, UT
    - (June 2011-July 2011)
        - Orthopedic Outpatient Setting
        - Evaluated and treated patients under direct supervision, mostly focusing on sporting injuries

Relevant Work Experience:

- Nexus Pain Care, Provo, UT
    - (August 2008-April 2010)
        - OR Crew
        - Assisted patients in preparing for procedures and follow up
        - Assisted doctors with spinal injection procedures

- Human Performance Institute, American Fork, UT
    - (August 2007-August 2008)
        - PT technician
        - Assisted therapists in making sure patients' needs were met
        - Instructed exercises including proper technique under PT supervision

Research:

- Therapeutic neuroscience education for patients with chronic low back pain and its effect on activity level, pain perception, and function
  (2011-2013)

Professional Membership/Certifications/Skills:

- APTA, NPTA member since 2010
- First Aid/CPR certified since April 2011
- Fluently speak Mandarin Chinese

Amber E. Domingo

6275 Boulder Hwy #2137, Las Vegas, NV 89122
(775) 287-3863
dodda6@unlv.nevada.edu
NV PT license (pending)

Education:

- **Bachelor of Science in Health Ecology with Distinction** Dec. 2007
  University of Nevada, Reno, NV
- **Doctor of Physical Therapy** Degree expected May 2013
  University of Nevada, Las Vegas

Clinical Internship Experience:

- Athleticare, Las Vegas, NV
  January-March 2013
  - Orthopedic outpatient clinic
  - Evaluated and treated a variety of orthopedic conditions with an emphasis on return to sport and function. Environment was collaborative with a team-centered approach to patient care.
- Summerlin Hospital, Las Vegas, NV October-December 2012
  - Acute inpatient
  - Evaluated and treated a variety of patients including cardiac, orthopedic, and general surgical in an acute care setting. Interdisciplinary approach was utilized to maximize efficiency.
- HealthSouth Las Vegas, Las Vegas, NV July-October, 2012
  - Rehabilitation hospital
  - Evaluated and treated a variety of patients with an emphasis on neurological conditions including stroke, TBI, and SCI. Collaborated with OT to increase positive patient outcomes.
- Great Basin Physical Therapy, Minden, NV June 2011-July 2011
  - Outpatient orthopedic clinic
  - Evaluated and treated a variety of orthopedic conditions with a great emphasis on conditions of the spine. Treatments emphasized manual therapy.

Related Work/Volunteer Experience

- Wildcreek Physical Therapy, Reno, NV October 2007-May 2010
  - Physical Therapy Technician
  - Streamlined patient visits using good time management skills in collaboration with physical therapist. Assisted physical therapist with patient care and office organization as appropriate.
- Saint Mary's Catholic Healthcare, Reno, NV September 2009-January 2010
  - Volunteer
  - Assisted therapist with patient education and therapeutic exercise for patients following hip/knee replacements involving ROM and submaximal isometric contractions.

Other Work Experience

- Graduate Assistant – UNLVPT September 2011-May 2012

- Responsible for review classes for Neuroanatomy and Neurophysiology, as well as tutoring for Orthopedic Principles and Orthopedic Assessment for the physical therapy department at UNLV. Assisted in research studies involving Parkinson's disease. Mentored students who were struggling in the academic aspect of the physical therapy program.

Research experience:

- Mentored research project Expected completion: May 2013
    - Student investigator, lead writer and coordinator of research
    - Therapeutic neuroscience education for patient's with chronic low back pain and its effect on activity level, pain perception, and function

Professional memberships/certifications:

- APTA member since 2010
- CPR and AED certified since 2007 – American Heart Association Healthcare Provider

Continuing Education

- Combined Sections Meeting – Chicago, IL February 2012

Awards and Honors

- Phi Kappa Phi Academic Honor Society 2013

RYAN SPENCER, PT, DPT

9580 W Reno Ave #123, Las Vegas, NV 89148
801-682-3481 ryan.spencer77@yahoo.com PT license pending

EDUCATION:

Doctor of Physical Therapy
- University of Nevada, Las Vegas
- Graduation May 2013

Bachelor of Science in Athletic Therapy
- Weber State University
- Graduation May 2009

PROFESSIONAL EXPERIENCE:

Jackson Physical Therapy, Las Vegas, NV
Orthopedic Outpatient Physical Therapy
January-April 2013
- Evaluated and treated patients with a variety of orthopedic conditions
- Demonstrated efficient and effective documentation
- Provided an in-service on proximal and distal factors contributing to knee pain
- Managed 100% case load for the final 3 weeks of the clinical

Southern Hills Hospital, Las Vegas, NV
Acute Care Physical Therapy
October-December 2012
- Evaluated, treated, and planned discharge for patients with orthopedic and other medical conditions
- Performed appropriate wound care when indicated
- Managed 100% case load for the final 2 weeks of the clinical

Summerlin Hospital, Las Vegas, NV
Acute Inpatient Rehabilitation Physical Therapy
July-September 2012
- Evaluated and treated patients with neurological, musculoskeletal and cardiopulmonary conditions
- Demonstrated effective communication with patients, families, and staff
- Managed 100% case load for the final 2 weeks of the clinical

Mountain Land Physical Therapy, Layton, UT
Orthopedic Outpatient Physical Therapy
June-July 2011

- Effectively examined and evaluated patients' impairments, formulated a PT diagnosis and prognosis, and created an appropriate intervention to give each patient the best possible outcome
- Provided an in-service for ACL injury prevention and performance enhancement

WORK EXPERIENCE:

Mountain Land Physical Therapy
Orthopedic Outpatient Physical Therapy Aide
March 2007 – May 2010

- Maintenance of treatment area and equipment
- Instruction and supervision of therapeutic exercises
- Administration of therapeutic modalities
- Application of various taping techniques

Kays Creek Physical Therapy
Skilled Nursing Facility Inpatient Physical Therapy Aide
August 2009 – May 2010

- Assist residents with standing, transfers, and ambulation
- Instruction and supervision of therapeutic exercises
- Interaction and coordination with nursing staff

RESEARCH EXPERIENCE:

Mentored Group Research Project

- Therapeutic neuroscience education for patients with chronic low back pain and its effect on activity level, pain perception, and function

PROFESSIONAL MEMBERSHIPS/CERTIFICATIONS:

APTA/NV Chapter member since 2010
Healthcare Provider CPR/AED since 2007