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Foot Volume Change during Long Distance Running in Healthy Adults

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FOOT VOLUME CHANGE DURING LONG DISTANCE RUNNING IN HEALTHY ADULTS

By

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A doctoral project submitted in partial fulfillment

of the requirements for the

Doctorate of Physical Therapy

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THE GRADUATE COLLEGE

We recommend the doctoral project prepared under our supervision by

Meghan Boni, Istvan Takacs, and Rebecca Wilson

entitled

Foot Volume Change during Long Distance Running in Healthy Adults

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

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Abstract

Background and purpose: Healthy adults frequently engage in running as a means of cardiovascular exercise. Larger running shoes are often chosen based on common beliefs that feet swell during running, yet many continue to encounter foot injuries, such as blisters, as a result of this activity. Previous research has analyzed the changes in foot volume during short bouts of activity. However, there has been limited research on the effect of long distance running on foot volume, which is where many of these injuries are seen. The purpose of this study was to examine the effects of long distance running, defined as 10 kilometers (10K), on foot volume in healthy adults.

Subjects: Twenty-eight healthy subjects (18 females and 10 males) participated in the study.

Methods: Upon arrival, participation information (gender, running status) and baseline foot measurements (shoe size, foot volume) were obtained. After a 5 minute warm up, participants completed the 10K run at a self selected speed. Immediately following the completion of the run, comparison measurements were once again taken.

Results: No difference was found between pre and post volumetric measurements ($p=0.897$). There was a significant interaction in pre and post volumes between individuals classified as runners and non-runners ($p=0.014$) but simple main effects were inconclusive. A significant difference in the pre-run ($p=0.006$) and post-run (0.001) volumes of the two groups was observed, but there was no significant change in the foot volume of the runners ($p=0.100$) or the non-runners ($p=0.065$). No relationship existed between the difference in shoe to measured foot size and the foot volume change ($p=0.436$). There was no significance between gender and volume change ($p=0.868$). A statistically significant relationship was found to occur between outside temperature and foot volume change ($r=0.419$).

Discussion: Running a 10K did not result in a significant change in foot volume, even when subjects were divided by running status or gender. Since previous research has seen a trend towards foot volume increasing following short runs and decreasing following a marathon, a 10K run may be an equilibrium point between when a foot initially swells and when it shrinks smaller than its initial volume due to extraneous variables associated with a longer run (i.e. dehydration). Change in foot volume was related to the outside temperature, which may also be related to increased dehydration during runs in hotter temperatures.

Conclusion: This study found temperature as the only variable affecting foot volume following a 10 K run, with higher temperatures resulting in a greater change in foot volume. Due to the existence of several design flaws, the results should be interpreted with caution. Future studies should control for more of the confounding variables, by completing the run indoors and increasing the number of participants in order to improve overall power.

INTRODUCTION

Aerobic activities are important in maintaining good general health, but can sometimes result in swelling of the lower extremities.[1, 2] During everyday activities, the body maintains equilibrium between fluid in the tissues and the blood, pushing excess fluid back to the heart, so swelling does not form in the lower extremities.[3] In a healthy individual, venous resistance, venous valves, and contraction of lower extremity muscles, such as the gastroc-soleus complex, assist with the movement of fluid out of the legs and feet.[4] In individuals who have experienced a recent ankle or foot injury, excess fluid in the area can lead to further damage of the local tissues, because of injury to adjacent structures and decreased use of surrounding muscles.

Aerobic activities are often prescribed by healthcare professionals to improve cardiovascular fitness, and thus overall health.[1, 5-7] Which cardiovascular activity is chosen is based on patients' conditions and their predetermined goals. Patients prone to lower extremity swelling, such as those with lymphedema or heart conditions, may need to take extra precautions to avoid adverse affects associated with this type of activity. Depending on a person's activity level, they may react differently to initiating exercise.

Swelling can also occur in healthy populations, but usually only after strenuous cardiovascular exercise sessions, and is attributed to an increase in blood flow to the exercising muscles.[1] This swelling does not usually result in long term adverse effects, self correcting after completing the aerobic activity. Several studies have found foot volume to increase during running, and some studies have seen similar increases after walking.[1,2,6] There has been evidence to show that during and after exercise, there is an increase in interstitial and extracellular volume, resulting in swelling, as it relates to

workload.[8] Other studies found lower extremity volume to decrease after aerobic activities. Stick et al. (1993) found foot volume decreased after walking, suggesting that the musculo-venous pumping system counterbalanced the excess blood in the area by increasing the local muscle activity. This allowed excess fluid to be pumped out of the interstitial areas, thus decreasing foot volume.[9-13] In unpublished data by McWhorter, marathon runners showed decreased foot volume following their run (McWhorter, J.W., unpublished data, December 2008). Although it can be expected that the musculo-venous system was pumping fluid out of the lower extremities, this finding is also likely a result of added dehydration associated with the strenuous activity. There continues to be a lack of consensus in the literature concerning these findings.[6]

A phenomenon which receives attention in the sport community is swelling in the lower extremities of trained runners. Some runners purchase shoes a half size larger than their measured foot size to accommodate the assumed increase in foot volume during running. However, the research literature on foot volume during running are conflicting with some research studies supporting the idea that feet swell during a run,[1,2] while others show changes in foot volume differ depending on the activity and the duration for which it is being performed.[9-12] If foot volume is not seen to increase, wearing larger shoes may result in blisters, a common injury seen in nearly 40% of marathon runners.[14] In 2010, Teyhen et al. discussed the importance of appropriately fitting shoes on lower extremity injury prevention in the military and found that only 64% of the U.S. Army soldiers in the study wore correctly fitting shoes (i.e. within half size of their measured foot size).[7]

In the past, investigators researched differences in foot volume between activities such as standing, walking, and running for short durations of time or for short distances.[1,

[2] These studies found mixed data on foot volume during walking, but all found an increase in foot volume with short distance runs.[2,6] Although running short distances results in foot swelling, it is currently unknown what changes occur in foot volume following a long distance run.

Based on the lack of evidence on the effect of long distance running on foot volume, the purposes of this study consists of five hypotheses to determine if foot volume changes based on different variables. The primary purpose of this study was to examine the effects of long distance running on foot volume in healthy adults, so the primary hypothesis was that participants' foot volumes would change after completing the run. It was also hypothesized that foot volume would differ depending on whether participants were runners or non-runners, since runners' bodies may be able to adapt to and counterbalance the physiological changes more quickly than those who do not frequently subject their bodies to this type of activity.

Secondary hypotheses for this study were that there would be a positive correlation between change in foot volume and the difference between measured foot size to chosen shoe size, because a larger difference would allow more area for the foot to swell. It was also hypothesized that foot volume would differ depending on gender. Hormones play a major role in fluid retention and since males and females differ in the amounts and types of circulating hormones, it was hypothesized that their foot volumes would differ as a result.[15] Finally, foot volume change may also be influenced by temperature during the run. Increased sweating occurs in hotter temperatures especially during cardiovascular activities, and the additional loss of fluid may be mirrored in the participants' foot volume.

METHODS

Participants

The study consisted of 28 healthy participants (18 females, 10 males) between the ages of 18 and 31. Participants were screened prior to the event and were excluded if they were sick, pregnant, or if they had experienced orthopedic problems during the past year. There was no inclusion or exclusion criteria based on distance ran per week; however, all participants' physical activity level ranged from moderate to very active. We defined runners as those running regularly 3 or more times a week, regardless of distance. Participants were recruited through word of mouth and through fliers placed around the University of Nevada, Las Vegas campus.

Study Design/Procedure

Following informed consent, participants rested in supine for 10 minutes. During the rest period, each participant was instructed on the procedure for the measurements, warm-up, and 10 kilometer (10K) design. While in supine the size of the running shoe they would wear during the run was recorded, along with resting blood pressure, heart rate, and oxygen saturation. This was done as a safety precaution, and participants were excluded if their blood pressure was over 140/90 or under 90/60. They were also excluded if their oxygen saturation was under 90%.

After 10 minutes, they were asked to remove their right shoe and sock, and stand on a Brannock device with their heel against the back in order to measure their true foot size (The Brannock Device Company, 116 Luther Ave, Liverpool, NY,13088, USA). They returned to a seated position and slowly lowered their right foot into the assigned Lucite volumeter, with their heel against the back wall, until their foot was firmly on the

floor of the container (Foot Volumeter, P.O. Box 146, Idyllwild, CA. 92349). The displaced water flowed out of the volumeter and into a dry receptacle (see Figure 1.). While the researcher measured the displaced water in a graduated cylinder, the participants dried their foot and donned their sock and shoe.

When all measurements were recorded, the participants were given 5 minutes for their normal warm-up routine, after which they began the 10K run at a self selected speed. Upon completion of the run, the participants returned to a seated position, removed their right shoe and sock, and placed their foot back into the assigned volumeter. All post-run measurements were repeated in the same positions for later analysis.

Instrumentation

As described above, foot size was measured using the Brannock device, which is designed and calibrated for obtaining the proper fit for athletic footgear. Foot volumes were measured using a Lucite volumeter set (see Figure 2). The set consisted of the volumeter container, an obturator which is used to calibrate the water levels prior to each measurement, a container in which to catch the excess water, and a 1000-ml graduated cylinder. A manual blood pressure cuff and stethoscope were used to record blood pressure, and a finger pulse oximeter was used to determine heart rate and oxygen saturation prior to and after the run. Temperature was recorded using local recorded values at the time of the runs.

Past studies have investigated the reliability and validity of foot measurements using Lucite volumeters, and have found it to be a reliable method of measurement.[1, 6, 16, 17] Pilot testing was performed to allow the researchers to practice taking foot volume measurements. The 3 researchers involved in data collection measured the volume of 9

participants with no more than 5 minutes between measurements in order to find inter-rater reliability. ICC 3 analysis was used to show reliability for this study, but did not generalize the reliability of the instrument for other studies. The measurements demonstrated a reliability ICC of 0.997 (see Table 1).

Data Analysis

Data were analyzed using PASW 18 statistical package for Windows® (233 South Wacker Drive, 11th Floor Chicago, Illinois, 60606-6412, USA). A paired t-test was used to compare the participants' foot volumes prior to and after completing the run. A 2 X 2 mixed factorial ANOVA was used to analyze the interaction between runner status (runner/non-runner) and foot volume (pre-/post-run). A Pearson product moment correlation (r) was used to assess the relationship between the difference in foot and shoe size (shoe size minus foot size) and the change in foot volume (post-run foot volume minus pre-run foot volume). For analysis of gender differences, a 2 X 2 mixed factorial ANOVA was used to compare gender (male/female) and change in foot volume. A Pearson product moment correlation (r) was used to investigate the relationship between outside temperature and change in foot volume. All alpha levels for statistical significance were set at 0.05.

RESULTS

Comparisons of pre and post run data found no significant change between pre-run and post-run foot volumes (see Figure 1), $t(27)=0.130$, $p=0.897$. When participants were divided based on runner status, there was a significant interaction $F(1,26)=6.976$, $p=0.014$ (see Figure 1). In order to break down the interaction, four post hoc tests were

conducted (2 paired t-tests, 2 independent samples t-tests), with a Bonferroni correction of α=0.0125. Although an interaction appeared in the initial ANOVA testing (p=0.014), the interaction was not realized during post-hoc testing. This interaction only showed that non-runners had significantly larger foot volumes both before and after the 10 K run compared to runners. There was no significant change in the foot volume of the runners (p=0.100) or the non-runners (p=0.065) after completing the run.

No statistically significant relationship was found between difference in shoe size to measured foot size and foot volume change, r=-0.153, p=0.436. Nor was there a statistically significant interaction between gender and pre/post measurements on foot volume, F(1,26)=0.026, p=0.868. Main effects were analyzed, which determined males (mean-558.6, SE=47) not differ from females (mean=456.2, SE=35.3) in their foot volume. Pre-run foot volume (mean=508, SE=28.7) did not significantly differ from post-run foot volume (mean=506.8, SE=30.7) for the two groups, p=0.874 (see Figure 3). The correlation between outside temperature and foot volume change showed a statistically significant relationship, r=0.419, p=0.027, r^2=0.176. Outside temperature during the run explained 17.6% of the change in foot volume (see Figure 4).

DISCUSSION

The results of this study showed foot volume did not differ after completing a 10K run. Since past studies analyzing short distances showed foot volume to increase and those focusing on a marathon showed it to decrease, a 10K run may be the transition point in foot volume where the foot is beginning to lose its initial increase in volume. This would result in measuring no change in volume, which was seen in this study. Past

research has found short distance runs to result in an increase in foot volume,[2,6] and many of these researchers speculated this was caused by the body's inability to keep up with pumping the excess fluid out of the legs due to a short exercise time. Preliminary data by McWhorter on marathon runners has found foot volume to decrease. (McWhorter, J.W., unpublished data, December 2008) This could be caused by dehydration due to excessive sweating, which would decrease the overall water volume within the body.

There was also no change in foot volume between participants that were categorized as runners or non-runners. It could be speculated that some of the study's participants, who were categorized as runners, run farther than 10K on a daily basis and their bodies were better trained to the task. Research on rats has found that when participating in moderate intensity exercise, rats lose more total body water and extracellular water than when they participate in low intensity exercise. This fluid loss, however, decreases significantly over a 3 week period if they continued to participate in this level of exercise, showing that at a moderate intensity exercise, a training effect can occur and fluid levels could be maintained more efficiently.[18] In this case, these individuals would not consider a 10K as a long distance.

There was no correlation demonstrated between the difference of measured foot to shoe size and the change in foot volume. In a previous study, it was found that the greater the shoe size to measured foot size difference, the greater potential for an increase in foot volume (3%).[1] However, in that study, the participants only slowly ran on a treadmill for a period of ten minutes, in comparison to 10K on a dirt track as in this study. Another study suggested that the difference between foot size and shoe size is a factor that needs to be considered, because the size difference determines the available area into

which the foot has the opportunity to swell.[19] According to the results of our study, this is not a necessary factor to consider when running 10 kilometers given that there was no difference in foot volume when looking at shoe size compared to foot size. If this data holds true for running this distance, people should choose running shoes based on comfort as opposed to planning for possible foot volume changes.

Gender was also not found to play a role in foot volume change. Hormones found in larger quantities in women, such as estradiol, estrogen, and progesterone have a direct effect on body fluid regulation.[20] High levels of estrogen can alter electrolyte levels in the body and fluid homeostasis, and influence many processes in the body including those regulating the sweat glands.[15] Males also have estrogen but in much smaller amounts. Hydration would also have an influence on hormone levels, as they would be found in higher concentrations in participants who are dehydrated. In males, it has been found that testosterone to cortisol levels may be altered depending on their hydration state, with those who are hypohydrated prior to running having a much lower ratio following their run.[21] This is a result of increased cortisol, not testosterone, levels, signifying that if males are not adequately hydrated prior to running, their bodies react by increasing their stress response. Because of these differences in circulating hormones and general fluid retention, we believed a person's gender would play a role in foot volume following the 10K. Although research supports estrogen's effect on fluid retention, and altering testosterone to cortisol ratios in males, gender did not play a role in foot volume changes in this study.

Since the 10K was completed on an outdoor track in June 2010 and February 2011, outside temperature was one of the variables considered, and was the only

measured variable found to have an effect on foot volume. Foot volume decreased as outside temperature increased, which may be due to more fluid loss (i.e. sweating) in response to the increased temperature. Since temperatures were just beginning to reach above 100°F in June, participants bodies' may not have acclimatized to the increased temperature as they may have if they completed the study towards the end of summer. Research finds that it takes about 10 to 14 days for complete heat acclimatization, which may not have been able to occur at the time of the runs occurring in June.[22] Physiological adaptations that occur in the body during heat acclimatization include increased sweat rate, lowered threshold for onset of sweating, and decreased electrolyte content of sweat.[22,23] In February, temperatures were mild (i.e. lows around 40°F) allowing the runners to maintain homeostasis without having to sweat as much to cool their bodies down during the run. The effect of temperature has been supported by other studies, which state that extreme hot and cold temperatures have an effect on volume.[2,11,12,16] However, it has been reported that individuals who performed endurance training at least 3 times a week have better thermoregulation while running in a hot environment and, therefore, were least affected by the heat.[24] Runners who have a higher heat tolerance show a lower increase in body temperature, lower heart rate, and lower amounts of stress hormones (norepinephrine and cortisol) during running, signifying a lower stress response by the body.[25] One result of the physiological adaptations that the human body goes through during this improvement in thermoregulation is its ability to decrease the onset of sweating.[22,23] These findings combined with our study suggest that foot volume changes may be weather dependent and that as the runner becomes more accommodated

to hot climate, they do not have to sweat as much to regulate their body temperature during running and as a result, foot volume may not change.

Participants' fluid intake was not reported which may have contributed to foot volume. A 2011 study found that athletes who drank more water during an ultra-marathon had a greater increase in limb volume in both their arms and their legs.[26] Some participants drank fluids during the 10K run, while others waited until after the run and measurements were completed to drink any fluids. While this could affect the results of the change in foot volume, it was not measured by the researchers because we wanted to measure how foot volume changed in situations mirroring that which would occur on a typical run for our study participants. At least one participant reported that she stopped to use the restroom during the run which may have decreased the body's fluid levels and affected her foot volume following the run. This was an unexpected occurrence and was also not accounted for in the calculations.

Also, the total run time as well as the speed was not recorded. The researchers did not expect the run times to have such a wide distribution, so it was not accounted for on the data collection sheet. However, running at a self selected speed allowed for a better resemblance of changes in foot volume that would occur during typical 10K runs. The participants were asked to run as much as they were able, but their total run time ranged from just over 40 minutes to about 100 minutes. Participants who walked the majority of the distance should have been excluded in order to increase validity, but were included in data analysis since run times were not recorded. As has been shown in previous research, differences occur in a person's foot volume depending on whether they walk or run, which may have affected our results.[1] Participants' speed may have affected the volume

change, as well as whether or not they typically ran distances equal to those in the study. If a participant frequently ran 10K their body may be able to better compensate during the run, allowing them to minimize their body's fluid volume difference.

The foot volume changes between males and females were compared to analyze whether gender played a role in foot volume changes after running. However, the study included almost twice as many females as it did males (18 and 10 respectively). Since the study already had a small number of participants, this added to the already low power. Due to this disparity in numbers, it is difficult to predict whether there would have been a difference in foot volume change if there was an equal number of each gender, and if the study had more people participate.

CONCLUSION

This study found no change in participants' foot volumes after completing a 10K run. There was no volume change between runners and non-runners, or males and females, and no correlation between the difference of measured foot to shoe size and the change in foot volume. However, foot volume was found to significantly decrease as outside temperature increased, but due to day to day changes in weather (i.e. temperature, wind, humidity) this finding may be caused by the combination of weather elements rather than solely outside temperature. In future studies, weather could be controlled by completing the study indoors and testing all participants during the same time of year. Since there were found to be several design flaws, all the results should be interpreted with caution. In order to be confident with the results, the study needed to have more control of confounding variables and include a larger sample size to increase its power.

Table 1. Inter-rater reliability statistics (95% confidence interval): means and standard deviations

Rater Number	Mean	Standard Deviation
1	658.56	211.011
2	655.11	208.030
3	661.67	213.576

Figure 1. Foot volume measurement technique using Lucite volumeter with receptacle.

Figure 2. Lucite volumeter set: volumeter, obturator, container for excess water, 1000-ml graduated cylinder

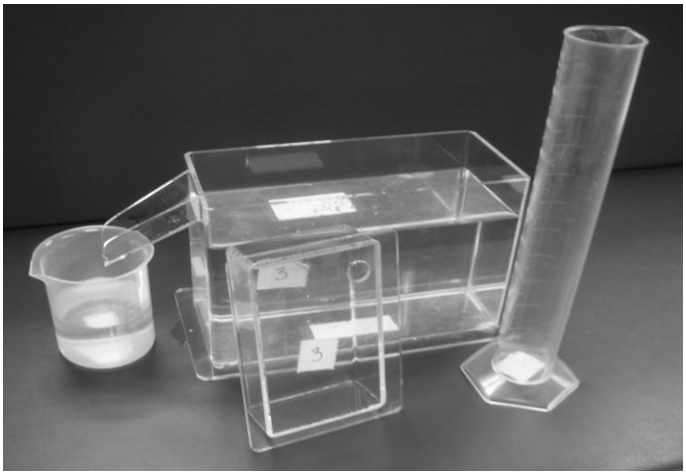


Figure 3. Measured foot volume before and after completing 10K run, by variable.

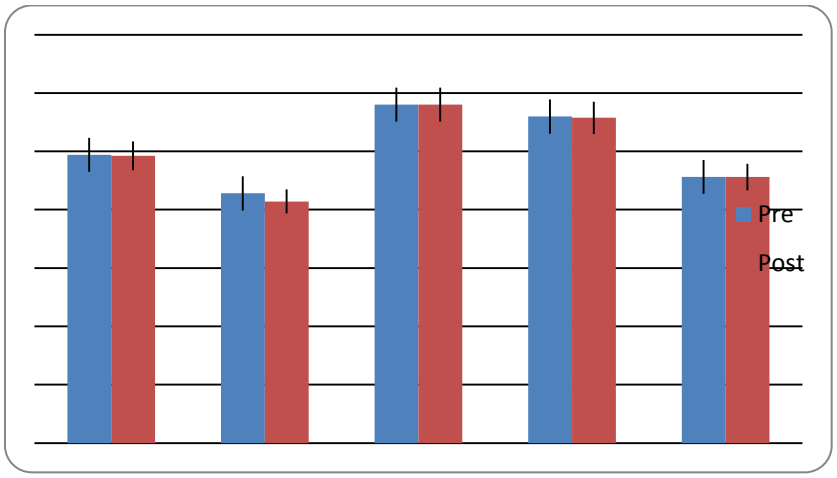
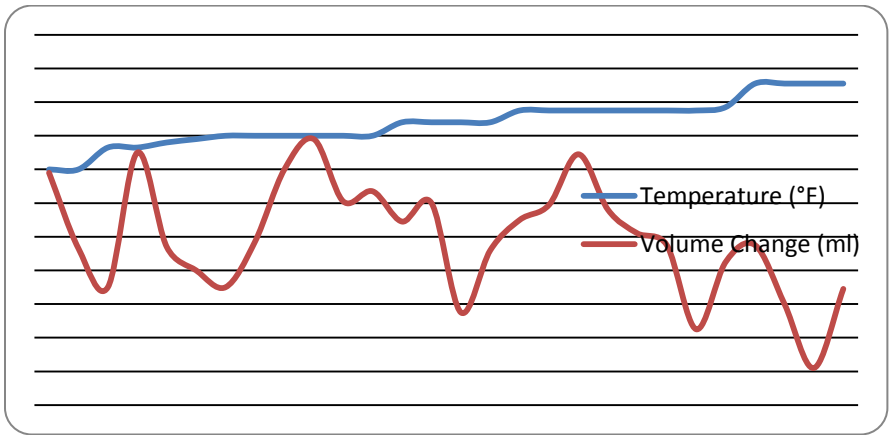


Figure 4. Correlation of temperature to foot volume change.



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Curriculum Vitae
MEGHAN BONI

EDUCATION

May 2012 **University of Nevada, Las Vegas** - *Las Vegas, NV*
Doctorate of Physical Therapy

May 2009 **Arizona State University** - *Tempe, AZ*
Major: BS in Family & Human Development Minor: Psychology
Certificate: Early Childhood Intervention
Graduated Summa Cum Lade with Honors Diploma (3.9 GPA)

SIGNIFICANT COURSEWORK

- Anatomy & Physiology
- Exercise Physiology
- Neuroanatomy, Physiology, & Rehabilitation
- Orthopedic Principles, Assessment, and Rehabilitation
- Research Methods & Statistics
- Cardiopulmonary Rehabilitation
- Pediatrics
- Geriatrics
- Orthotics & Prosthetics

PROFESSIONAL EXPERIENCE & TEACHING

Jan.-Mar. 2012 **Sunrise Children's Hospital** - *Las Vegas, NV* (12 weeks)
- Student Physical Therapist; In-Patient Children's Hospital
- **Responsibilities**: Evaluated & treated adults and children throughout the hospital.
Assisted with wound care. Observed treatment in the NICU for positioning and calming.
Provided treatment to out-patient children in the NICU follow-up program.

Oct.-Dec. 2011 **Renown Rehabilitation Hospital** - *Reno, NV* (10.5 weeks)
- Student Physical Therapist; In-Patient Rehabilitation Hospital
- **Responsibilities**: Created & progressed exercise programs, taught safe completion of functional tasks, participated in weekly care plan meetings, & wrote letters of medical necessity for specialized equipment. Created a protocol for treatment of patients with hip injuries for future use by the therapy team.

July-Sept. 2011 **Maricopa Integrated Health System - Burn Center** - *Phoenix, AZ* (11 weeks)
- Student Physical Therapist; Acute Care Burn Center
- **Responsibilities**: Evaluated & treated children/adults with burns/chronic wounds.

Assisted with casting in the OR, cared for sheet grafts, performed ROM & positioning for vented patients, taught stretching & exercise programs to maximize patient's outcomes, & actively participated in weekly care plan meetings.

June-Aug. 2010 **Rowville Physiotherapy** - *Melbourne, Australia* (6 weeks)
- Student Physical Therapist; Out-Patient Clinic
- **Responsibilities**: Evaluated and treated orthopedic & chronic pain patients by performing manual therapy & desensitization, taught individualized gym programs, & wrote letters/called doctor's offices concerning patients' progress, need for continued therapy, & discussion of improvement of care through further diagnostic testing.

RESEARCHEXPERIENCE

May 2012 **Doctoral Dissertation:** Boni, Meghan, Wilson, Rebecca & Takacs, Istvan. *The effects of long distance running on foot volumetrics in healthy adult runners.*

April 2009 **Undergraduate Honors Thesis:** Boni, Meghan & Ringenbach, Shannon. *The influence of music and chanting instructions on bimanual drumming in adults with Down syndrome.*

PROFESSIONAL MEMBERSHIP & RELATED WORKSHOPS

2009-Present **APTA & NPTA Member**

2011-Present **APTA Section Member**
- Clinical Electrophysiology & Wound Management, Pediatrics, and Acute Care Sections

July 2011 **7th Annual Burn Care Symposium** - *Phoenix, AZ*
- Learned about newest methods in care for severe burns, from admit to out-patient.

June 2011 **Coordinator of UNLV Physical Therapy Annual Golf Tournament** - *Las Vegas, NV*
- Planned & organized tournament at Siena Golf Club, with all proceeds benefitting the department.

March 2010 **Combined Sections Meeting** – San Diego, CA
- Attended various courses on pediatric treatments and wound care.

HONORS & AWARDS

2009-2012 WICHE Scholarship Recipient
2005-2009 Dean's List – Multiple Semesters
May 2008 Fitch- Craig Scholarship
May 2007 Elizabeth Mont's Scholarship
Feb. 2006 The National Society of Collegiate Scholars Member
May 2004 P.E.O. Scholarship

Curriculum Vitae

Istvan Takacs

Education:

B. S, Kinesiology, University of Nevada, Las Vegas, NV, 2007
D.P.T, Physical Therapy, University of Nevada, Las Vegas, NV 2012

Significant Coursework:

Biomechanics/Orthotics & Prosthetics
Exercise Physiology
Motor Learning and Behavior
Anatomy and Physiology
Neuroanatomy and Physiology
Orthopedic Assessment and Treatment
Cardiopulmonary Rehabilitation
Pediatric Rehabilitation
Research Methods and Research Statistics

Professional Experience & Teaching:

Select Physical Therapy
Kansas City, MO
January 2012 to April 2012
Student Physical Therapist
Responsibilities:
Supervised clinical affiliation in orthopedic outpatient setting.

Spring Valley Hospital
Las Vegas, NV
September 2011 to December 2011
Student Physical Therapist
Responsibilities:
Supervised clinical affiliation in acute care setting.

Cleveland Clinic, Lakewood Hospital
Lakewood, OH
July 2011 to September 2011
Student Physical Therapist
Responsibilities:
Supervised clinical affiliation in inpatient rehabilitation setting.

Corvallis Sport and Spine

Corvallis, OR
June 2010 to August 2010
Student Physical Therapist
Responsibilities:
Supervised clinical affiliation in orthopedic outpatient setting.

University of Nevada, Las Vegas
Las Vegas, NV
May 2007
Undergraduate Teaching Assistant
Job responsibilities:
Instruction of undergraduate biomechanics lab sessions

Doctoral Dissertation

Boni, Meghan, Wilson, Rebecca, Takacs, Istvan. *Foot volume change during long distance running in healthy adults*. April 2010- May 2012.

Workshops/Lectures

Kinesiology Graduate Seminars 2006-2007
Combined Sections Meeting in San Diego, CA 2010
Combined Sections Meeting in Chicago, IL 2012

Honors and Awards

Millennium Scholarship 2002-2006
Dean's Honor List 2003-2007

Curriculum Vitae

Rebecca Wilson, SDPT

Education:

University of Nevada Las Vegas DPT program 2009-present
Doctorate of physical therapy, expected graduation May 2012
University of Nevada Las Vegas 2004 -2009
Bachelor of Science in Kinesiology

Doctoral Dissertation:

Boni, Meghan, Wilson, Rebecca, Takacs, Istvan. *Foot volume change during long distance running in healthy adults*. April 2010- May 2012.

Clinical Experience:

- Athleticare, January 2012- March 2012
  - Performed evaluations and designed treatment programs for individuals with various orthopedic injuries and limitations.
  - Became skilled at performing manual therapy techniques to improve function and ROM.

- Summerlin Hospital and Medical Center- Acute care, October 2011- December 2011
  - Gained experience in treating patients with multiple diagnoses in the ICU.
  - Performed wound care, including wound vacs, and various wounds.
  - Observed the roles of a physical therapist in the neonatal intensive care unit (NICU).

- Spring Valley Hospital Rehab, July 2011- September 2011
  - Developed skills at treating patients with hip and knee replacements, strokes, and general deconditioning.
  - Gained knowledge of how to observe gait deviations and how to correct them.

- Summerlin Hospital Outpatient Pediatrics, June 2010- July2010
  - Developed skills at identifying patient limitation (i.e. Gait deviations) and gained knowledge of the roles of an outpatient pediatric physical therapist.
  - Assisted in evaluating and treating children with neurological disorders such as Cerebral Palsy, torticollis and developmental delay from the ages of 5 months-11 years old.
  - Presented inservice on effects of hippotherapy on children with neurological disorders.

Work Experience/Employment:

Tim Soder Physical Therapy- Begin June 2012

Technician- Tina Baum Physical Therapy and Women's Health,
September 2007- April 2009

- Observed the responsibilities of a physical therapist in an outpatient setting.
- Assisted physical therapists in applying therapeutic modalities such as heat, ice, electric stimulation, and ultrasound.
- Educated patients how to perform rehabilitative exercises correctly.

Professional Membership: APTA member 2009-present

Licensure Information:

Physical Therapy Board Exam- Passed March 2012