

5-16-2020

Reliability of the Lateral Reach Test in People with Unilateral Transfemoral Amputations

Stephen Hill

University of Nevada, Las Vegas, Stephenhill49@gmail.com

Samantha Leonard

University of Nevada, Las Vegas, Samanthaaleonard@gmail.com

Elizabeth Vianey Trujillo

University of Nevada, Las Vegas, evtrujillo@gmail.com

Follow this and additional works at: <https://digitalscholarship.unlv.edu/thesesdissertations>



Part of the [Physical Therapy Commons](#)

Repository Citation

Hill, Stephen; Leonard, Samantha; and Trujillo, Elizabeth Vianey, "Reliability of the Lateral Reach Test in People with Unilateral Transfemoral Amputations" (2020). *UNLV Theses, Dissertations, Professional Papers, and Capstones*. 3771.

<https://digitalscholarship.unlv.edu/thesesdissertations/3771>

This Dissertation is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Dissertation in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Dissertation has been accepted for inclusion in UNLV Theses, Dissertations, Professional Papers, and Capstones by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact digitalscholarship@unlv.edu.

RELIABILITY OF THE LATERAL REACH TEST IN PEOPLE WITH UNILATERAL
TRANSFEMORAL AMPUTATIONS

By

Stephen Hill
Samantha Leonard
Elizabeth Vianey Trujillo

A doctoral project submitted in partial fulfillment
of the requirements of the

Department of Physical Therapy
School of Integrated Health Sciences
Graduate College

University of Nevada, Las Vegas
May 2020



Doctoral Project Approval

The Graduate College
The University of Nevada, Las Vegas

May 16, 2020

This doctoral project prepared by

Stephen Hill

Samantha Leonard

Elizabeth Vianey Trujillo

entitled

Reliability of The Lateral Reach Test in People with Unilateral Transfemoral Amputations

is approved in partial fulfillment of the requirements for the degree of

Doctor of Physical Therapy
Department of Physical Therapy

Daniel Young, Ph.D.
Research Project Coordinator

Kathryn Hausbeck Korgan, Ph.D.
Graduate College Dean

Merrill Landers, Ph.D.
Research Project Advisor

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

Abstract

Purpose/Hypothesis:

Lateral reach testing has been established as useful in quantifying stability and fall-risk for older populations without limb loss,¹ and has potential for providing useful information about fall-risk, recovery, and rehabilitation of individuals after unilateral trans-femoral amputation. Investigators sought to determine the feasibility and reliability of the Lateral Reach Test (LRT) in people with unilateral trans-femoral amputations.

Number of Subjects:

Nine individuals, aged 20-68, with a unilateral trans-femoral amputation were recruited for this study. Two females and seven males participated, and the average height and weight for the group was 167cm and 76kg, respectively. Three participants had right trans-femoral amputations while six had left trans-femoral amputations. Participants were over 18 years old, were currently using a lower-limb prosthesis for walking and were able to walk independently 50 meters without help from others. Exclusion criteria included history of low back pain surgery, bilateral leg pain, radiological/clinical diagnosis of spinal stenosis, radiological/clinical diagnosis of structural scoliosis, spinal malignancy, spinal infection, shooting pain down the leg, allergy to adhesive and current involvement in an insurance claim or litigation relating to back pain.

Materials and Methods:

Participants stood on a dual-belt split treadmill instrumented with Bertec force plates, with an overhead harness for safety. Each foot was placed on a force plate. Participants reached out laterally with a closed fist, horizontally displacing a marker on a meter stick. In order for the trial to be counted, the participant had to successfully return to the original standing position without any assistance. Testing was completed twice, at least one week apart. The average of three

measures for each side was used for analysis. Reliability measurement consisted of comparing the distance reached on each day.

Results:

The intra-rater ICC was 0.86 when the participant reached to the amputated side. The intra-rater ICC was 0.96 when the participant reached to the non-amputated side. There is no significant difference between mean distance reach to the amputated side compared to the non-amputated side.

Conclusions:

The lateral reach test has excellent reliability and was found to be fast and easy to administer in this population. Further studies are needed with regard to the test's validity.

Clinical Relevance:

The Lateral Reach Test is reliable can be carried out easily and quickly in a clinical setting in persons with a transfemoral amputation. It may be a useful assessment tool for balance and mobility to improve quality of life in this population.

Table of Contents

Abstract.....	iii
Table of contents.....	v
Introduction.....	1
Balance.....	2
Weight Bearing.....	2
The Lateral Reach Test.....	3
Methods.....	4
Participants and instrumentation.....	4
Procedure.....	6
Results.....	7
Discussion.....	8
Conclusion.....	10
References.....	11
Curriculum Vitae.....	14

Introduction

Nearly 2 million people live with limb loss in the U.S. and that number is expected to more than double by the year 2050.² Lower limb amputations are the most common type of amputation.^{2,3} Amputations often lead to secondary complications and compensations, including poor balance, increased rates of falls and injury, asymmetrical weight-bearing patterns, degenerative joint conditions, and low back pain (LBP).⁴⁻⁷ Some correlations to altered center of pressure (COP) and altered biomechanics have been suggested.^{4,5} Further, Pell et al. showed that among persons with amputated limbs, overall quality of life was poor secondary to restricted mobility.⁸ They also concluded that rehabilitation following amputation of a limb should primarily focus on improving mobility in order to improve perceived quality of life.⁸ Additionally, a higher level of amputation, transfemoral versus transtibial, has been associated with decreased functional mobility.⁹ Individuals with lower limb amputations experience falls and injuries secondary to falls at a rate equal to or greater than “frail elderly adults;”¹⁰ these falls are a public health concern and merit further studies with regard to balance, postural instability, and specific rehabilitation approaches.

The Lateral Reach Test (LRT) is useful in evaluating stability during a reaching task and assessing fall risk for older populations without limb loss.^{1,11,12} The LRT specifically challenges medial-lateral stability as movement is restricted to the frontal plane. It has the potential to provide useful information about the recovery and rehabilitation of individuals after unilateral transfemoral amputation; however, it has not been tested in this population. The LRT, if proven reliable and valid, may eventually be used to guide rehabilitation efforts for those with lower limb amputations. As physical capabilities vary among individuals with lower limb loss and users of different prosthetic devices, it is important to establish if such a test can yield reliable clinical test outcomes. Therefore, examining the feasibility and reliability of this measurement is necessary.

Balance

Balance is an issue for individuals who have sustained lower limb loss, as evidenced by their increased rate of falling. According to a study conducted by Miller et al., 52.4% of people with lower limb loss reported falling in a time span of one year and injury after falls was reported by 40.4% of those who sustained falls.⁵ For some perspective, in the general population, the CDC reports that 25% of adults over age 65 experiences a fall each year.¹³ In another study by Miller, close to 50% of individuals with a lower extremity amputation who have fallen report having a fear of falling.¹⁴ Interestingly, balance confidence and a lack of a fear of falling was found to be associated with increased mobility and social activity.¹⁴

According to Rougier and Bergeau, balance during quiet stance is expected to be altered after lower limb amputations.⁴ Hip-loading and unloading strategies are thought to be significant with respect to frontal plane balance. Balance control in the sagittal plane is thought to be negatively altered due to a lack of active control of the ankle joint after most lower limb amputations.⁴ Rougier and Bergeau also found that people with lower limb amputation exhibited an anterior and lateral shift in center of pressure (COP) toward the sound leg.⁴ Functional reach testing is a clinical measure that has predictive validity in identifying recurrent falls.¹⁵ Evaluation of balance is often necessary to assess a person's level of function in order to initiate an appropriate plan of care. A clinical tool, such as the LRT, will help to assess balance in those with above the knee lower extremity (LE) amputation.

Weight Bearing

Weight bearing asymmetries during functional movements are common in those with LE amputations.¹⁶ Compared to individuals with both LEs intact, those with LE amputations had increased loading on the intact limb during a sit to stand task.¹⁷ During ambulation, Schaarschmidt, et al. found increased contact time of the intact limb compared to the amputated

limb during the single support phases of gait.¹⁸ This contact time asymmetry was magnified during slower walking speed. These weight bearing asymmetries are associated with secondary conditions such as osteoarthritis, osteoporosis and osteopenia in those with LE amputations.¹⁶

In studies on individuals without amputations, weight bearing asymmetries during standing led to postural instability and increased postural sway velocity in the medial-lateral direction,⁷ while individuals with LBP exhibited a significantly larger magnitude of weight bearing asymmetry, in the medial-lateral directions, compared to individuals without LBP.¹⁹

The Lateral Reach Test

The LRT is a tool that can be easily used in a clinical setting by physical therapists and other medical professionals.²⁰ The LRT is a measurement tool in which the individual is asked to reach out to one side as far as possible while maintaining a fixed base of support; both feet are to maintain contact with the ground throughout testing.²¹ Medial-lateral stability and a person's ability to balance primarily on one leg are challenged and researchers suggest the LRT can be a useful tool to determine one's limit of stability.¹⁰ Commonly used physical outcome measures for amputees include the Amputee Mobility Predictor (AmpPro), the Timed Up and GO (TUG), the six minute walk test, and the Barthel Index.^{16,22-24} None of the aforementioned measurement tools analyze the amputee's ability to maintain medial-lateral stability in standing while reaching left or right. The LRT has been used in patients who have sustained a stroke, individuals with Parkinson's Disease, multiple sclerosis and vestibular disorders, yet there is no research evaluating the LRT in a population with lower limb loss.²¹ A clinical balance test reflecting the ability to control the body at the lateral limits of stability for those with above knee amputations is therefore required. The aim of this study was to establish test-retest reliability of the LRT for those with transfemoral amputations.

Methods

Participants and Instrumentation

IRB approval was granted before recruiting participants. Qualifying characteristics included >18 years old, an above-knee-amputation, currently using a lower-limb prosthesis for walking, and able to walk 50 meters independently. Individuals with the following characteristics were not included in the study: history of back surgery, bilateral leg pain, radiological/clinical diagnosis of spinal stenosis, radiological/clinical diagnosis of structural scoliosis, spinal malignancy, spinal infection, shooting pain down the leg, allergy to adhesive, and current involvement in an insurance claim or litigation relating to back pain. Participants were recruited in the Las Vegas area via word of mouth and flyers from prosthetic clinics, amputee support groups, and from the University of Nevada Las Vegas (UNLV) faculty and students. Data was collected at the UNLV campus in the Clinical Locomotion and Neuromechanics lab (CLNL). The Standard Error of Measurement (SEM) and Minimal Detectable Change were calculated according to the following formulas, respectively: $SEM = SD \times [\sqrt{(1 - ICC)}]$, $MDC_{95} = 1.96 \times SEM \times (\sqrt{2})$.²⁵

Each participant provided written consent to perform the LRT and completed a variety of printed outcome measures prior to any testing. The outcome measures are as follows: Short Form Survey (SF-36), Patient-Reported Outcome Measure Information System (PROMIS-29), the Oswestry Low Back Pain Disability Questionnaire, and the Prosthetic Limb User Survey for Mobility (PLUS-M). The SF-36 is a survey that measures one's general health and is able to distinguish differences in quality of life between individuals with similar medical profiles.²⁶ The PROMIS-29 evaluates physical function, depression, anxiety, fatigue, sleep disturbance, the ability to participate in activities, pain interference and pain intensity to determine one's health and well-being.²⁷ The Oswestry is a survey that assesses one's functional disability due back

Figure 1: Original starting position in the overhead harness secured to the Bertec force plate.

pain.²⁸ Lastly, the PLUS-M is a self-reported instrument that determines the quality of mobility amongst lower limb amputees.²⁹ All of these outcome measures help capture an assessment of the individual as a whole.

Participants were asked to stand on a Bertec³⁰ force plate, while harnessed overhead for safety. This setup allowed participants to reach as far as they could without risking a fall. The vest-like harness, with an anterior clip, was able to be adjusted to fit various trunk lengths. The harness had a strap on each shoulder with loops connected to the overhead beam via a carabiner (Figure 1).

A meter stick with a measurement apparatus horizontally attached to a tripod at the participant's shoulder level was oriented in the direction of the reach during the LRT. Lubricant was applied to the measurement apparatus before each test to ensure smooth operation (Figure 2).



Figure 2: Measurement apparatus

Procedure

Once the participant was hooked into the overhead harness and the meter stick was adjusted to shoulder level, testing began. Participants were asked to reach out laterally with the ipsilateral arm and move the measuring apparatus as far as possible while making a fist. Compensations such as dropping the shoulder or arm were avoided with this setup as these compensations did not increase the reach distance, and actually prevented the participant from getting the marker farther along the ruler. Participants were instructed to keep both feet on the ground at all times while keeping the opposite arm at their side. Rotation or pivoting about the foot was allowed as long as contact with the ground was maintained. Bilateral foot contact on the ground was verified by force plate readings on the computer. The procedure was repeated with the opposite arm for a total of three trials in each direction. If any of these conditions were not met or if the participant lost foot contact, needed to grab the support bars, or took a compensatory step to regain balance during the procedure, the participant was instructed on the protocol and re-tested. The average of three measures for each side was used for analysis. Participants repeated the bilateral reaching trials in a second session that was a minimum of one week after the first session in order to test the reliability of the LRT.

Reliability of the lateral excursion measurement was evaluated using the Intraclass Correlation Coefficient (ICC) and a 95% confidence interval (CI). An ICC_{3,3} model was used to determine intra-rater reliability between measurements on the first day and measurements on the second day. Each participant was assessed by the same rater, and the reliability was calculated from an average of three measurements. Analysis included reliability of lateral reach distance for the amputated side and for the non-amputated side. A t-test was also performed to determine differences in mean distance reached between the first and second days. Statistical analyses were conducted using SPSS Statistics v.25 software (IBM, Armonk, New York).

Results

Nine individuals with unilateral transfemoral amputation were recruited for this project, two females and seven males. Three participants had right transfemoral amputation and six had left transfemoral amputations.

Table 1 lists ICC, along with 95% CI values. Table 2 lists Minimal Detectable Change. Good reliability (ICC = 0.86) was found when the participant reached to the amputated side. Reliability was excellent when the participant reached to the non-amputated side (ICC = 0.96). We observed no statistically significant difference between mean lateral distance reached to the amputated side compared to the non-amputated side (Affected = 10.09 +/- 2.91, Non-affected = 10.82 +/- 2.84; $t = -0.77$, $p = 0.449$ [two-tailed]). (Amputated = 10.09 +/- 2.91, Non-amputated = 10.82 +/- 2.84; $t = -0.77$, $p = 0.449$ [two-tailed]).

Table 1: Mean, Standard Deviation, and ICC values for Intra-Rater reliability of Lateral Reach Distance

	Mean Distance (in) (SD)		
	1 st Day	2 nd Day	ICC (95% CI)
Amputated Side	10.1 (3.1)	10.1 (2.9)	0.86 (0.47 - 0.97)
Non-Amputated Side	10.8 (3.0)	10.9 (2.9)	0.96 (0.82 – 0.99)

Table 2: Minimal Detectable Change for Lateral Reach Mean Distance, 1st Day and 2nd Day

	1 st Day	2 nd Day
Amputated Side	3.2	3.0
Non-Amputated Side	1.7	1.6

Discussion

The LRT had high test-retest reliability, which supports further evaluation of this test for validity. Although performance values of the participants were highly consistent overall, four out of nine participants either lost foot contact, needed to grab the support bars, or took a compensatory step to regain balance during the procedure at least once. Three out of those four needed five trials in order to obtain three viable trials for reach. The remaining one only needed one additional trial. No participants lost balance to the point where the suspension harness was needed. Participants, in general, commented that the test was easy and fast.

Acquisition of functional skills is a primary focus of physical therapy, and a lateral lean is a component of many functional skills (getting up, transferring, dressing, manipulating objects, etc.). Since the LRT quantifies an individual's ability to reach as far as they can laterally while maintaining their balance to return to standing, clinicians may be able to evaluate a patient with a transfemoral amputation against an established norm. Further studies could help to determine the specific relevance of LRT results. In a clinical setting, this test could be used even before a patient is ambulatory as an assessment of balance. We recommend conducting the test in parallel bars or using an overhead harness system for safety and using visual assessment, perhaps by a second tester, to ensure bilateral foot-floor contact during the entirety of the test.

Increasing awareness of evidenced-based practice, clinicians and practitioners seek objective values to measure the effectiveness of rehabilitation assessment and treatment techniques. The purpose of our study was to determine the reliability of the LRT in people with unilateral transfemoral amputations. Future research will be needed to support the validity of the test.

This study is not free from limitations. Participants were only recruited from the Las Vegas area, which may not be indicative of the entire population with LE limb loss. Each participant completed the LRT twice, introducing the possibility of patient learning reflected in increased distance in the second visit. The LRT was completed twice, at least a week apart, but not all participants had the same time interval between visits one and two. Other potential sources of error exist and include the participant (concentration, fatigue, anxiety, learning), the tester (visual observation, instructions), and the testing environment (distractions, equipment, positioning of patient).

Conclusion

As previously stated, individuals who have a unilateral transfemoral amputation are an under-served and under-researched population, and with numbers rapidly increasing in the nation. The LRT was found to be reliable and feasible for those with unilateral transfemoral amputations, and as such may be a useful tool for clinicians and practitioners as an assessment tool for balance and mobility to improve quality of life for these individuals.

References

1. Brauer S, Burns Y, Galley P. Lateral reach: a clinical measure of medio-lateral postural stability. *Physiother Res Int.* 1999;4(2):81-88. doi:10.1002/pri.155
2. Ziegler-Graham K, MacKenzie EJ, Ephraim PL, Travison TG, Brookmeyer R. Estimating the Prevalence of Limb Loss in the United States: 2005 to 2050. *Archives of Physical Medicine and Rehabilitation.* 2008;89(3):422-429. doi:10.1016/j.apmr.2007.11.005
3. Hammarlund CS, Carlström M, Melchior R, Persson BM. Prevalence of back pain, its effect on functional ability and health-related quality of life in lower limb amputees secondary to trauma or tumour: a comparison across three levels of amputation. *Prosthet Orthot Int.* 2011;35(1):97-105. doi:10.1177/0309364610389357
4. Rougier PR, Bergeau J. Biomechanical analysis of postural control of persons with transtibial or transfemoral amputation. *Am J Phys Med Rehabil.* 2009;88(11):896-903. doi:10.1097/PHM.0b013e3181b331af
5. Miller WC, Speechley M, Deathe B. The prevalence and risk factors of falling and fear of falling among lower extremity amputees. *Archives of Physical Medicine and Rehabilitation.* 2001;82(8):1031-1037. doi:10.1053/apmr.2001.24295
6. Kusljugić A, Kapidžić-Duraković S, Kudumović Z, Cickusić A. Chronic low back pain in individuals with lower-limb amputation. *Bosn J Basic Med Sci.* 2006;6(2):67-70. doi:10.17305/bjbms.2006.3177
7. Anker LC, Weerdesteyn V, Nes IJW van, Nienhuis B, Straatman H, Geurts ACH. The relation between postural stability and weight distribution in healthy subjects. *Gait & Posture.* 2008;27(3):471-477. doi:10.1016/j.gaitpost.2007.06.002
8. Pell JP, Donnan PT, Fowkes FGR, Ruckley CV. Quality of life following lower limb amputation for peripheral arterial disease. *European Journal of Vascular Surgery.* 1993;7(4):448-451. doi:10.1016/S0950-821X(05)80265-8
9. Davies B, Datta D. Mobility outcome following unilateral lower limb amputation. *Prosthetics and Orthotics International.* 2003;27(3):186-190. doi:10.1080/03093640308726681
10. Hunter SW, Batchelor F, Hill KD, Hill A-M, Mackintosh S, Payne M. Risk Factors for Falls in People With a Lower Limb Amputation: A Systematic Review. *PM R.* 2017;9(2):170-180.e1. doi:10.1016/j.pmrj.2016.07.531
11. Thompson M, Medley A. Forward and lateral sitting functional reach in younger, middle-aged, and older adults. *J Geriatr Phys Ther.* 2007;30(2):43-48.
12. DeWaard BP, Bentrup BR, Hollman JH, Brasseur JE. Relationship of the Functional Reach and Lateral Reach Tests in Elderly Females. *Journal of Geriatric Physical Therapy.* 2002;25(3):4.
13. Important Facts about Falls | Home and Recreational Safety | CDC Injury Center. <https://www.cdc.gov/homeandrecreationalafety/falls/adultfalls.html>. Published August 24, 2018. Accessed October 13, 2018.

14. Miller WC, Deathe B, Speechley M, Koval J. The influence of falling, fear of falling, and balance confidence on prosthetic mobility and social activity among individuals with a lower extremity amputation - Archives of Physical Medicine and Rehabilitation. [https://www.archives-pmr.org/article/S0003-9993\(01\)15026-4/fulltext](https://www.archives-pmr.org/article/S0003-9993(01)15026-4/fulltext). Accessed September 12, 2018.
15. Duncan PW, Studenski S, Chandler J, Prescott B. Functional Reach: Predictive Validity in a Sample of Elderly Male Veterans. *J Gerontol*. 1992;47(3):M93-M98. doi:10.1093/geronj/47.3.M93
16. Gailey RS, Roach KE, Applegate EB, et al. The amputee mobility predictor: an instrument to assess determinants of the lower-limb amputee's ability to ambulate. *Arch Phys Med Rehabil*. 2002;83(5):613-627.
17. Highsmith MJ, Kahle JT, Bongiorno DR, Sutton BS, Groer S, Kaufman KR. Safety, energy efficiency, and cost efficacy of the C-Leg for transfemoral amputees: A review of the literature. *Prosthetics and Orthotics International*. 2010;34(4):362-377. doi:10.3109/03093646.2010.520054
18. Schaarschmidt M, Lipfert SW, Meier-Gratz C, Scholle H-C, Seyfarth A. Functional gait asymmetry of unilateral transfemoral amputees. *Human Movement Science*. 2012;31(4):907-917. doi:10.1016/j.humov.2011.09.004
19. D. Childs J, R. Piva S, E. Erhard R, Hicks G. Side-to-side weight-bearing asymmetry in subjects with low back pain. *Manual Therapy*. 2003;8(3):166-169. doi:10.1016/S1356-689X(03)00014-6
20. Weiner DK, Duncan PW, Chandler J, Studenski SA. Functional Reach: A Marker of Physical Frailty. *Journal of the American Geriatrics Society*. 1992;40(3):203-207. doi:10.1111/j.1532-5415.1992.tb02068.x
21. Jonsson E, Henriksson M, Hirschfeld H. Does the functional reach test reflect stability limits in elderly people? *J Rehabil Med*. 2003;35(1):26-30.
22. Schoppen T, Boonstra A, Groothoff JW, de Vries J, Göeken LN, Eisma WH. The Timed "up and go" test: reliability and validity in persons with unilateral lower limb amputation. *Arch Phys Med Rehabil*. 1999;80(7):825-828.
23. Lin S-J, Bose NH. Six-minute walk test in persons with transtibial amputation. *Arch Phys Med Rehabil*. 2008;89(12):2354-2359. doi:10.1016/j.apmr.2008.05.021
24. Treweek SP, Condie ME. Three measures of functional outcome for lower limb amputees: a retrospective review. *Prosthet Orthot Int*. 1998;22(3):178-185. doi:10.3109/03093649809164482
25. Hoyer EH, Young DL, Klein LM, et al. Toward a Common Language for Measuring Patient Mobility in the Hospital: Reliability and Construct Validity of Interprofessional Mobility Measures. *Phys Ther*. 2018;98(2):133-142. doi:10.1093/ptj/pzx110
26. Health Status Questionnaire (SF-36). National Multiple Sclerosis Society. <http://www.nationalmssociety.org/For-Professionals/Researchers/Resources-for->

Researchers/Clinical-Study-Measures/Health-Status-Questionnaire-(SF-36). Accessed November 8, 2019.

27. Hays RD, Spritzer KL, Schalet BD, Cella D. PROMIS®-29 v2.0 profile physical and mental health summary scores. *Qual Life Res.* 2018;27(7):1885-1891. doi:10.1007/s11136-018-1842-3
28. Oswestry Low Back Disability Questionnaire. :3.
29. Prosthetic Limb Users Survey of Mobility (PLUS-M). <http://www.plus-m.org/>. Accessed November 21, 2019.
30. Force Plates. Bertec. <https://www.bertec.com/products/force-plates>. Accessed November 21, 2019.

Curriculum Vitae

Stephen Hill
4505 S Maryland Pkwy
Las Vegas, NV 89154
Stephenhill@gmail.com

Education

DPT University of Nevada Las Vegas 2017- May 2020 Doctorate of Physical Therapy

BS Brigham Young University 2010-2016 Exercise Science

Certifications

- Certified Strength and Conditioning Specialist (NSCA) (Jan 2019)
- CPR Certified (April 2018)
- CITI Program for Human Research (February 2018)
- HIPPA Training Certified (September 2017)
- Blood-borne Pathogens Training Certified (September 2017)

Work Experience

- Student Physical Therapist at Mountain View Hospital – Acute Rehab (Jan 6th-March 27th, 2020)
- Student Physical Therapist at Valley Hospital – Emergency Department (Sept 30th-Dec 11th, 2019)
- Student Physical Therapist at Family and Sport Physical Therapy (July 8th-Sept 27th, 2019)
- Student Physical Therapist at Select Physical Therapy (June 25th, 2017-August 3^d, 2018)

Current Research Activity

- Reliability of the Lateral Reach Test in Transfemoral Amputees-
 - Jay Ciccotelli PT, DPT; Samantha Leonard, SPT; Elizabeth Trujillo, SPT
 - Data collection, Research Article Creation

Membership in Professional Organizations

- Member of the American Physical Therapy Association (2017- Present)
- Member of the Nevada Physical Therapy Association (2017- Present)
- Member of the National Strength and Conditioning Association (2019- Present)

Service

Professional

- Rock Steady Boxing (March 3, 2019)
 - Equipment setup, exercise instructor, encourage and support participants
- Nevada Parkinson's Movement Day – (October, 2019)
 - Event setup, member of the welcome team, and custodial work.
- UNLV Interview Day Volunteer
 - Event setup, research lab demonstrator, clean-up
- Johnson & Johnson Ambassador – NATA Conference (June 25-27, 2019)
 - Set up Johnson & Johnson Booth
 - Product distribution, ambassador for questions, direct to salesmen

Community

- Youth Group President- LDS Church (June 2017-June 2019)
 - President of local church youth group, led weekly group activities, counseled young men in life skills
- Regional Presidency Member – LDS Youth Group (June 2019- Present)
 - Second Counselor – Led seven youth group presidencies in SW LV area, planned regional activities, counselor to youth in community
- Eagle Scout Project Volunteer
 - Jan 2019 – Lucas Dean Eagle Project– Hot Springs Campsite clean up
 - March 2019 – Ben Shumway Eagle Project – Toy/Clothes Pick up

Continuing Education Attended (last 2 years)

- Sept 24, 2018 – Dr. David Homes- Sport Didactic Lecture- “Soft Tissue and Manipulation”
- Sept 6, 2018 – Brown Bag Lecture “Why your DPT is worthless and what you can do about it” Beren Shah, Rob Robb
- June 8, 2018 – Bench to Bedside “Exercise Induced Brain Changes in PD” – Beth Fisher USC
- May 11, 2018 – G3 Research Presentations
- April 18, 2018 – Adriaan Louw – Pain education lecture
- March 5, 2018 – Fidias Leon-Sarmiento – New hire presentation
- February 12, 2018 - Donna Costa, DHS, OTR/L, FAOTA, “Managing Stress in College Students with the Koru Mindfulness Programs”
- Nov 16, 2017- Brown bag lecture - Mitch Smith – Wellness Therapy Clinic- Cash Based Practice
- Nov 14, 2017-NVPTA meeting - Jason Longhurst – “Freezing of gait in Parkinson’s Disease”
- Oct 27, 2017- Distinguished Lecture Series APTA President - Sharon Dunn
- Oct 26, 2017- Distinguished lecture series Special Presentation - APTA President Sharon Dunn
- Sept 21, 2017- Brown bag lecture “Pain Medicine and You” Mahesh, Hahuru MD.
- Sept 12, 2017 – NVPTA meeting- Neuro Restorative Facility Staff
- Sept 11, 2017 – “Tendonopathy of achilles tendon.” Dr. David Kramer

Samantha Leonard
4505 S Maryland Pkwy
Las Vegas, NV 89154
Samanthaaleonard@gmail.com

Education

SPT University of Nevada Las Vegas 2017- May 2020 Doctorate of Physical Therapy

BS Grand Canyon University 2013-2017 Biology with an emphasis in Physical Therapy

Certifications

- Hawkgrips IASTM level 1 (September 2018)
- CPR Certified (April 2018)
- CITI Program for Human Research (February 2018)
- HIPPA Training Certified (September 2017)
- Blood-borne Pathogens Training Certified (September 2017)

Work Experience

- Student Physical Therapist at Synergy Physical Therapy at Anthem (Jan 6th-March 27th, 2020)
- Student Physical Therapist at Centennial Hills Hospital (Sept 30th-Dec 11th, 2019)
- Student Physical Therapist at Spring Valley Hospital Rehabilitation (July 8th-Sept 27th, 2019)
- Student Physical Therapist at Family and Sport Physical Therapy (June 25th, 2017- August 3rd, 2018)

Current Research Activity

- Reliability of the Lateral Reach Test in Transfemoral Amputees- with Jay Ciccotelli, DPT, Stephen Hill, SPT and Elizabeth Trujillo, SPT

Membership in Professional Organizations

- Member of the American Physical Therapy Association (2017- Present)
- Member of the Nevada Physical Therapy Association (2017- Present)

Service

- Volunteer for Walk for Wishes (March 7th, 2020)
- Volunteer at Las Vegas Rescue Mission (October 23rd, 2018)
- Volunteer at Parkinson's Moving Day (October 20th, 2018)

- Volunteer at Las Vegas Rescue Mission (October 18th, 2018)
- PT Day of Service at 3 Square (October 13th, 2018)
- Moderator of simulation lab for ATCs at UNLV (April 23th, 2018)
- Volunteer at Synergy Physical Therapy grand opening (April 7th, 2018)
- Volunteer at Nevada Health Link Health Fair (December 15th, 2017)
- Volunteer at Wings for Autism (October 21, & February 26th, 2017)

Continuing Education Attended (last 2 years)

- 11/14/2017- NPTA Meeting: “Freezing of Gait in Parkinson’s Disease”- Jason Longhurst PT, DPT, NCS, MSCS, CDP
- CSM 2018
 - 2/22 - CSM Educational Session: “Sports Medicine Secrets: Motor Control Impairments in the Overhead Athletes”- Stephania Bell PT, CSCS, OCS; Marshall LeMoine PT, DPT, OCS, FAAOMPT; Drew Morcos PT, DPT, OCS, SCS, ATC, CSCS, FAAOMPT; Michael Wong DPT, OCS, FAAOMPT
 - 2/22 - CSM Educational Session: “Dry needling for Tendinopathy?”- Amy McDevitt PT, DPT, OCS, FAAOMPT; Paul Mintken PT, DPT, OCS, FAAOMPT
 - 2/23 - CSM Educational Session: “Transformational Chronic Back Pain Program: PNE Multidisciplinary Approach”- Lauren Davis PT, DPT; Jill Dubbs PT, DPT; Christine Schulte PT, MBA; Ian Stephens PT, DPT, OCS; Mary Stilphen PT, DPT.
 - 2/23 - CSM Educational Session: “Neuromuscular Training After ACLR to Decrease ACL Reinjuries and Risk in Young Female Athletes”- James Andrew, MD; Rafael Escamilla PT, Ph.D.; Kevin Wilk PT, DPT, FAPTA; Kyle Yamashiro DPT.
 - 2/24 – CSM Platform: “Direct Access Physical Therapy Portal of Entry Compared With Physician Portal of Entry for Temple University Employees with Recent Onset Musculoskeletal Conditions: A Blinded Randomized Controlled Trial.” – H.A. Ojha; J. Fritz; J. Brandi; J. Wu; A.L. Malitsky; K.M. Fleming; R.R. Beidleman; D. Rhon; M.G. Weiner; W. Wright
 - 2/24 – CSM Platform: “Which Patients Are More Likely to Return to Outpatient Physical Therapy? An Examination of the Risk Factors Related to a Patient’s Return to Physical Therapy and the Association of that Return to the Utilization of Medical Services.” – J.A. Sharpe; J.K. Johnson; J.S. Magel; J. Fritz; A. Thackeray
 - 2/24 – CSM Platform: “Association of PROMIS Physical Function with Legacy Measures in the Outpatient Orthopedic Physical Therapy Setting.” – A. Thackeray; D.S. Brodke; J.S. Magel; J. Fritz; R. Hess
 - 2/24 – CSM Platform: “Measuring Expectations in Patients Awaiting Total Knee Replacement and its Relationship to Age.” – K.C. Madara; A.R Marmom; M.S. Aljehani; J. Zeni
 - 2/24 – CSM Platform: “Characterizing Patients Acceptable Symptom State at Short Term Follow Up of a Collaborative Primary Care PT/MD Collaborative Service” – Jeff Houck

- 2/24 – CSM Platform: “A Survey of Factors Influencing Patient-Reported Outcome Measure Completion” – E.O. Nelson; C. Chism; K. Ellifson
- 2/24 – CSM Platform: “Reliability and Validity of the Dance Functional Outcome Measure Survey (DFOS) In Adolescent Dancers” – T.R. Smith, A. Filipa; M.V. Paterno; S. Bronner; M. Strzelinski
- 2/24 – CSM Platform: “Wrist and Hand Pain in Orthopaedic Physical Therapists” – M. Campo; M. Hyland; D.G. Sueki; E. Pappas
- 3/12/2018- Brown Bag Lecture: “Runner’s (Leg) Dystonia”- Nancy N Byl, PT, MPH, PhD, FAPTA
- Hawkgrips IASTM level 1 certification course 9/8/18

Elizabeth V. Trujillo, SPT
4505 S Maryland Pkwy
Las Vegas, NV 89154
evtrujillo@gmail.com

Education

DPT University of Nevada, Las Vegas - Las Vegas, NV BS Stanford University, Stanford, CA

Licensure

License Pending Graduation May 2020

Certifications

2017-2020 2000-2004

Physical Therapy Mechanical Engineering

- Basic Life Support - CPR Training (April, 2018)
- Citi Training - Human Research, Biomedical IRB Course (February, 2018)
- Blood-borne Pathogens Training Certified (September, 2017)
- HIPAA Training Certified (September, 2017)
- 200 Hour Vinyasa Teacher Training Course (May, 2013)

Employment / Clinical Experience

- 01/20- 3/20 **Student Physical Therapist** - Physical Therapy & Balance Centers, Las Vegas, NV
- 10/19 -12/19 **Student Physical Therapist** - MountainView Hospital - Inpatient Rehabilitation, Las Vegas, NV
- 07/19 -09/19 **Student Physical Therapist** - VA Southern Nevada Healthcare System, North Las Vegas, NV
- 6/18 – 8/18 **Student Physical Therapist** - Desert Valley Therapy (ATI), Las Vegas, NV
- 01/16- 01/18 **Guest Teacher** - Clark County School District, Las Vegas, NV
- 10/06 – 06/14 **Assistant Civil Engineer**- Las Vegas Valley Water District, Las Vegas, NV

Current Research Activity

- 01/18- present: Reliability of Lateral Reach Test in People with Unilateral Transfemoral Amputations - Elizabeth V. Trujillo, SPT, Stephen Hill, SPT, Samantha Leonard, SPT, Jason Ciccotelli, DPT, CWS, Szu Ping Lee, PT, PhD

- Writing and Editing Final Draft

Presentations

- 02/14/2020 : Presenter, American Physical Therapy Association, Combined Sections Meeting APTA, Denver, CO
 - Reliability of Lateral Reach Test in People with Unilateral Transfemoral Amputations, Poster Presentation

Language Skills

- English - Native language
- Spanish - Native language
- Japanese - Basic conversational

Membership in Professional Organizations

- Member American Physical Therapy Association (2017 to present)
- Member Nevada Physical Therapy Association (2017 to present)

Service

- 09/29/2018 Fall Risk Screening Clinic - “Stepping On” Fall Prevention Program
- 04/23/2018 Volunteer - Simulation Lab for Certified Athletic Trainers,
- 04/12/2018 UNLV Student-led Interview: Maninderjit Kaur, PT, PhD
- 04/05/2018 Translator - Survey Data Collection “Mobility Outcomes and Patient Perception of the Benefits of Physical Therapy”
- 01/26/2018 Volunteer - UNLVPT 2018 Interview Day
- 12/15/2017 Volunteer - Nevada Health Link Holiday Health Fair
- 11/13/2017 Student-led Interview: Dr. Jennifer Nash
- 11/06/2017 Student-led Interview: Dr. Nicholas Branch
- 01/13-03/15 Treasurer - Gender Justice Nevada
- 04/13-05/14 Yoga Instructor - The Center

Continuing Education Attended (last 2 years)

- American Physical Therapy Association, Combined Sections Meeting, Denver, CO
 - Saturday February 15th, 2020: Jeffrey Taylor-Haas, PT, DPT, OCS, CSCS, Christa Wille, PT, DPT, Liz Chumanov, PT, PhD, Rich Willy, PT, PhD - “Specialized Running Populations: Tailoring Care to Maximize a Runner’s Health Across the Lifespan”
 - Saturday February 15th, 2020: Munira Hudani, PT - “Beyond the Linea Alba: A Revolutionary New Framework for Assessing and Treating Diastasis Rectus Abdominis”
 - Friday, February 14th, 2020: Ameer L. Seitz, PT, PhD, DPT, OCS, Gretchen Meyer, PhD, Lucas T. Buchler, MD - “Muscle Degeneration of the Rotator Cuff: Scientific Advances to Guide Surgery and Rehabilitation”

- Friday, February 14th, 2020: Laurie G. Kilmartin, PT, DPT, Kevin Moore, BSN, RN - "Optimizing Rehabilitation Management for Gender-Affirming Care and the Transgender Patient: A Multidisciplinary Approach"
- Friday, February 14th, 2020: Teresa L. Elliott-Burke PT, DPT, MHS, WCS, PRPC, BCB-PMD, Thomas Joseph Dillon PT, DPT, OCS- "The 4th Trimester: Differential Screening, Examination, and Treatment Considerations for the Postpartum Patient"
- Thursday, February 13th, 2020: CSM After Dark
- Thursday, February 13th, 2020: Dr. Jared Spencer Vagy, Dr. Duane M. Scotti, Dr. Stephanie Jones Greenspan - "Hanging in Thin Air: Pushing and Pulling in Rock Climbers', Circus Artists', and Gymnasts' Shoulders"
- Thursday, February 13th, 2020: Dr. Jessica Bridget Drummond - "Nutrition and Lifestyle Medicine for Endometriosis Care"
- Thursday, February 13th, 2020: Dr. Roberta Kuchler O'Shea, Yasser Salem, Mica A Mitchell, Nia Irene Mensah, Karla Ann Bell, Melissa Carole Hofmann - "Hot Topics in Diversity, Equity, and Inclusion for Pediatric PTs and PTAs"
- Saturday February 29th, 2020, Las Vegas, NV: Julieta Elliot - "Breath and Pilates"
- Thursday, September 12th, 2019, Las Vegas, NV: Anthony Delitto PT, PhD, FAPTA - "Finishing the Job of Evidence Based Practice" 0.25 CEUs
- Saturday, November 16th, 2018, Las Vegas, NV: Irene S Davis, PhD, PT, FACSM, FAPTA, FASB - "Well Aligned, Soft Landings: A Cure for Running Injuries?" 0.25 CEUs
- Friday, November 15th, 2018, Las Vegas, NV: Irene S Davis, PhD, PT, FACSM, FAPTA, FASB - "Footwear Matters: Let's Think Differently about the Foot" 0.15 CEUs
- Saturday September 15th, 2018: Chris Doerger PT, CP - "Gait Training and Exercises for Amputees"
- Monday, August 27th, 2018: Sandra a Billinger, PT, PhD, FAHA "#fortheloveofscience - A Clinical Scientist's Journey"
- Saturday August 18th, 2018: Catherine Turner PT, DPT, OCS - "Basic Joint Assessment," Lecture to UNLV Nurse Practitioner Students
- Saturday July 14th, 2018: Daniella Morton PT, DPT - "Physical Therapy for Amputees"
- Sunday May 20th, 2018, Online: Dr. Jennifer Stone - "Pelvic Health Applications for Orthopedic Clinicians"
- Performing Arts Wellness Symposium - CFA Consortium for Health and Injury Prevention, UNLV, Las Vegas, NV
- Saturday, April 7, 2018: Stephen Caplan, Tod Fitzpatrick, Kimberly James, Louis Kavouras, Dolly Kelepecz, Michael Lugering, Glen Nowak, Catherine Turner PT, DPT - "Performing Can be Hazardous to your Health"
- Saturday, April 7, 2018: Dolly Kelepecz - "What is the Pelvic Floor and How do I Find It?"
- Monday, March 12th, 2018, Las Vegas, NV: Nancy Byl, PT, MPH, PhD - "Runner's Leg Dystonia: The Mystery Movement Disorder"
- Tuesday, March 6th, 2018: Dr. Fidias E. Leon-Sarmiento, MD, MSc, PhD - "Weakness and Fatigue in Neural Degeneration: From Disorder to Systems to Molecules and Back"
- Monday, February 12th, 2018, Las Vegas, NV: Dr. Donna Costa - "Managing Stress in College Students with the Koru Mindfulness Programs"
- American Physical Therapy Association, Combined Sections Meeting, New Orleans, LA, 18 CEUs
 - Saturday, February 24th, 2018: Kornelia Kulig, PhD, PT, Pamela Mikkelsen, PT, DPT, K. Michael Rowley, BS, BA, Hai-Jung Shih, BS, PT, Brooke Winder, PT,

- DPT - "Athletics Meets Aesthetics: Lower Extremity Injury Treatment in Dance vs. Sport"
- Saturday, February 24th, 2018: HPA - LGBTQI Catalyst Group Networking Meeting
 - Friday, February 23rd, 2018: Dennis Klima, PT - "Integrating Dance Into Best Practice Interventions for Older Adults"
 - Friday, February 23rd, 2018: Aquatic Physical Therapy Section Platform Presentations
 - Megan Fosko - "In Postmenopausal Women, Does Aquatic Exercise Compared to a Sedentary Lifestyle Maintain Bone Strength as Measured by Bone Mineral Density (BMD)?"
 - Bruce Moseley, JD - "Aquatic Therapy for Treatment of Autism Spectrum Disorder: A Double-Blinded, Randomized Controlled Clinical Trial"
 - Friday, February 23rd, 2018: Education Physical Therapy Section Platform Presentations
 - Cheryl Kerfeld, PT, PhD - "Moving Towards Patient-Centered Care: Assessment of Need for Lesbian, Gay, Bisexual, Transgender, and Queer Health Care Training in Doctor of Physical Therapy Programs"
 - Friday, February 23rd, 2018: Jennifer Bagwell, PT, DPT, PhD, Christopher Powers, PT, PhD, Alexander Weber, MD - "Femoroacetabular Impingement: A Theoretical Framework to Guide Clinical Practice"
 - Thursday, February 22nd, 2018: Karla Bell, PT, DPT, Delaney Bryan, SPT, Amanda LaLonde, PT, DPT - "Unchecked Box: Addressing Needs of Trans and Gender-Nonconforming DPT Students"
 - Thursday, February 22nd, 2018: Valerie Bobb, PT, DPT, Albina Heidebrecht, PT, DPT, Ramona Horton, PT, DPT, Christin Peters, PT, DPT, Barb Settles, PT, Sagira Vora, PT - "Complex Cases in Women's and Men's Health"
 - Thursday, February 22nd, 2018: Susan Clinton, PT, Ginger Garner, PT - "Are You Listening to Your Clients? What Their Voices Reveal About Dysfunction"