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The Effect of Physical Therapy on Patient Self-Reported Outcomes and Perceptions of Mobility After Lower Extremity Amputations

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THE EFFECT OF PHYSICAL THERAPY ON PATIENT SELF-REPORTED OUTCOMES AND PERCEPTIONS OF MOBILITY AFTER LOWER EXTREMITY AMPUTATIONS

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ABSTRACT

Background and Purpose: The number of people with limb loss is rapidly growing, partly due to an aging society and the prevalence of diabetes. Physical Therapy (PT) has been shown to improve perceived functional outcomes and quality of life in older adults and individuals with diabetes, but it is unclear why certain patients do not receive PT after amputation and whether the beneficial outcomes shown in other populations translate to individuals with limb loss. The purpose of this study was to determine whether receiving PT among patients with limb loss correlates with an improved quality of life, better mobility, and a decrease in fear of falling avoidance behavior when compared to those who did not receive PT. We also evaluated patient perception regarding confidence and satisfaction with their prostheses and barriers that prevented therapy.

Subjects: 48 patients with lower limb loss with prosthetic devices who were at least 6 months post-amputation were surveyed.

Methods: 40 male and 8 female (57.8±15.1 years) participants were recruited from local prosthetic and PT clinics, rehabilitation hospitals, and an amputee patient support group. All participants completed the following surveys: Short-Form 36 survey (SF-36), mobility section of Prosthesis Evaluation Questionnaire (PEQ), Fear of Falling Avoidance Behavior Questionnaire (FFABQ), and the Perception of Confidence of Mobility and Perception of Satisfaction of Mobility sections of the Amputee Perception Survey.

Results: Of our participants, 38 received Physical Therapy (YesPT) and 10 did not (NoPT). The YesPT group included individuals with unilateral above the knee (AK; 42.1%) and below the knee (BK; 42.1%) amputations, and 15.8% of higher level (i.e. hip disarticulation) or bilateral amputations. The NoPT group consisted of 10% AK and 90% BK amputations. A higher percentage of individuals in the YesPT group lost their limbs due to vascular causes than NoPT (36.8% vs 20%). There were no statistically significant differences in SF-36 Total (YesPT: 78.0±29.7 vs NoPT: 87.5±18.6; p=0.115), PEQ (YesPT: 86.3±32.1 vs NoPT: 85.0±29.5; p=0.907), FFABQ (YesPT: 13.2±14.8 vs NoPT: 7.0±7.5; p=0.208), Perception of

Confidence of Mobility section (YesPT: 7.4±2.4 vs NoPT: 8.7±1.7; p=0.128), or Perception of Satisfaction of Mobility section (YesPT: 7.3±2.4 vs NoPT: 6.9±3.2; p=0.653).

Discussion: Our research suggests that the presence of a more complex amputation (i.e. high level and bilateral) and a vascular etiology may be associated with receiving PT treatment after amputation. Barriers to receiving PT included cost, lack of health insurance, or patients not feeling they needed PT. Although no significant differences were found when comparing final outcomes among the YesPT and NoPT groups, there is a possibility that initial measures at the time of amputation may not have been similar; those that received PT may have initially had lower levels of mobility and function and needed PT to catch up to those that did not.

Conclusion: Our research did not show any statistically significant difference in SF-36, PEQ, FFABQ, or Amputee Perception Survey scores between individuals that received PT following lower limb amputation compared to those who did not receive PT. However, we were able to identify trends within our data, including a greater proportion of individuals receiving PT as a result of AK, bilateral, or vascular caused amputations when compared to individuals with BK, unilateral, or non-vascular caused amputations. We were also able to identify perceived barriers to receiving PT.

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INTRODUCTION

According to the Amputee Coalition of America, there are approximately 2 million people living with limb loss, or amputations, in the United States due to vascular diseases (54%) such as diabetes and peripheral vascular disease, and non-vascular causes such as trauma (45%), and cancer (less than 2%); these numbers are expected to double by 2050 (Varma, Stineman, & Dillingham, 2014; Ziegler-Graham, MacKenzie, Ephraim, Travison, & Brookmeyer, 2008). Amputations from a single disease are decreasing while amputations from multiple diseases are increasing (Varma et al., 2014). In 2005, across all etiologies, 42% of people with limb loss in the United States were 65 years or older, 65% were men, and 42% were non-white (1/90 non-whites live with limb loss compared to 1/250 whites) (Ziegler-Graham et al., 2008). The aforementioned statistics highlight care for limb loss as an emerging challenge to the health care system in the near future.

Physical therapy has been shown to improve health and function in those with diabetes or peripheral vascular disease, which is important to note because over 50% of the total population with limb loss in the U.S. were affected by these illnesses (Ziegler-Graham et al., 2008). A recent study in England found that people with diabetes undergo major amputations at a rate that is six times higher than people without diabetes (Ahmad, Thomas, Gill, & Torella, 2016). In addition, the World Health Organization estimates that the number of individuals with diabetes will grow by 180 million people worldwide from 2012 to 2030, an increase of 48% (World-Health-Organization, 2013). Receiving physical therapy care for this particular population is important because the mobility of those with amputations due to vascular causes (i.e. diabetes, peripheral vascular disease) is worse than people with amputations due to other etiologies (Davies & Datta, 2003). Ites et al. systematically assessed the efficacy of physical therapy interventions to improve mobility by reducing balance dysfunction in people with diabetic peripheral neuropathy (Ites et al., 2011). They compared modality interventions such as infrared energy therapy, vibrating insoles, lower extremity strengthening exercises, and use of assistive devices (i.e. cane, front wheel walker). They determined that lower extremity strengthening exercises reduced balance dysfunction, while the other interventions lacked sufficient evidence to support clinical use (Ites et al.,

2011). Kluding et al. also reviewed the important nature of physical therapy in people with diabetic peripheral neuropathy by determining that appropriate gait training and weight-bearing exercise did not increase the risk of foot pressure injuries (Kluding et al., 2017). The authors also highlighted the positive benefits of aerobic exercise in improving fitness, glycemic control and insulin sensitivity in people with diabetes (Kluding et al., 2017). They concluded that physical activity can decrease pain, normalize epidermal innervation, enhance nerve regeneration, and restore electrophysiological function, including restoration of neurotrophic growth factors, reducing oxidative stress and inflammation which may ultimately prevent peripheral nerve damage (Kluding et al., 2017).

Many patients with limb loss are older; the average age for a lower limb amputation due to peripheral vascular disease is 70 years (Stewart, Jain, & Ogston, 1992). The geriatric population is more susceptible to decreased mobility and falls, similar to those with amputations (Stevens-Lapsley et al., 2016). Among geriatric populations, physical therapy can be beneficial for decreasing fall risk, and improving balance and mobility (Stevens-Lapsley et al., 2016). One randomized controlled trial found that a 60-day progressive multicomponent intervention, consisting of progressive strengthening, mobility, and activities of daily living, resulted in significantly greater improvements in walking speed, Modified-Physical Performance Test, Short Physical Performance Battery Scores, as well as improvements in the 6-minute walk test when compared to the control group (Stevens-Lapsley et al., 2016). Authors of a systematic review found that personalized exercise protocols for geriatric patients showed a significant positive effect on gait speed and improved endurance on the chair rise test, reducing the time needed to stand up 5 times compared to that of the control group (Gine-Garriga, Roque-Figuls, Coll-Planas, Sitja-Rabert, & Salva, 2014). Shumway-Cook et al. also focused on the geriatric population and found that an individualized exercise program directed towards improving function decreased fall risk and improved mobility and function compared to those who did not receive treatment (Shumway-Cook, Gruber, Baldwin, & Liao, 1997).

Specific to individuals with limb loss, previous studies have demonstrated that patients who received inpatient rehabilitation experienced better outcomes 6-months post amputation when compared

to those who went to a skilled nursing facility (SNF) or were discharged directly home without inpatient care. The inpatient rehabilitation patients also had a 12% lower 1-year mortality rate (Dillingham & Pezzin, 2008; Sauter, Pezzin, & Dillingham, 2013). Following amputation in the hospital, patients that were discharged directly home showed diminished ability to perform physical tasks when compared to those who received inpatient physical therapy (Sauter et al., 2013). Among people who went to inpatient rehabilitation, SNF, or home, there was a statistically significant difference in the number of subsequent hospital non-amputation admissions within 12 months, which were 2.09, 2.32, and 2.43 admissions, respectively (Dillingham & Pezzin, 2008). Another study found that following a lower limb amputation, people that had inpatient rehabilitation, compared to being discharged home or to a SNF, had less symptoms of depression, less emotional suffering, and were more adept at managing their mental well-being (Pezzin, Padalik, & Dillingham, 2013). These studies help demonstrate that comprehensive rehabilitative care, including physical therapy, is beneficial for individuals with lower limb amputations. Dillingham et al. noted that 73% of inpatient rehabilitation subjects had received their prosthetic device post-amputation, and only 58% and 49% for SNF and home-discharge, respectively.

Studies have been done on the perceptions of patients and family members regarding their satisfaction with physical therapy treatment in various settings. In an intensive care unit setting, it was found that both patients and their family members felt that physical therapy was necessary and contributed to recovery, despite also being perceived as difficult and uncomfortable (Sottile, Nordon-Craft, Malone, Schenkman, & Moss, 2015). While older patients demonstrate greater satisfaction with treatment, and patient satisfaction is correlated with the quality of patient therapist interactions (Beattie, Pinto, Nelson, & Nelson, 2002), there is evidence that the outcomes of care are not always correlated with patient satisfaction (Hush, Cameron, & Mackey, 2011).

There is currently very limited research on outcomes and patient perception of physical therapy in a population with limb loss. It is imperative to learn more about this so that providers can effectively implement an individualized plan of care for the individuals with limb loss and create a better program to address their needs. Therefore, the purpose of this study was to compare functional outcomes of quality of

life, mobility, and fear of falling avoidance behavior between individuals with limb loss who have received physical therapy and those who have not. We also evaluated patient perception of physical therapy, including perceived barriers, and patient perception of confidence and satisfaction with their prostheses.

METHODS

Patients were recruited via flyers and word of mouth from prosthetic clinics in the Southern Nevada region (Las Vegas and Pahrump, NV). The participants were screened and given an explanation of the purpose and procedures of the study according to University of Nevada, Las Vegas Biomedical Institutional Review Board approval. The inclusion criteria consisted of: having lower extremity amputation or lower limb loss, being at least 18 years old, currently using a lower limb prosthesis for walking, and being at least 6-month post-amputation.

After obtaining informed consent, one of the investigators interviewed the participant and recorded data including gender, weight, height, age, cause of amputation, level of amputation, and whether or not they received PT after amputation. Patients then completed five written surveys; the Short-Form Health Survey (SF-36), the Physical Mobility (Group 4) portion of the Prosthetic Evaluation Questionnaire (PEQ), the Fear of Falling Avoidance Questionnaire (FFABQ), and the Amputee Perception Survey.

The SF-36 was created for use in clinical practice, research, health policy evaluations and general population surveys (Ware Jr & Sherbourne, 1992). The SF-36 measures general quality of life through eight health concepts: 1) limitations in physical activities because of health problems; 2) limitations in social activities because of physical or emotional problems; 3) limitations in usual role activities because of physical health problems; 4) bodily pain; 5) general mental health (psychological distress and well-being); 6) limitations in usual role activities because of emotional problems; 7) vitality (energy and fatigue); and 8) general health perceptions (Ware Jr & Sherbourne, 1992). The Intraclass Correlation Coefficient (ICC), measuring inter-rater reliability, for each of the eight scales of the SF-36 is 0.78-0.94,

exceeding the minimum reliability standard of 0.50-0.70 (McHorney, Ware Jr, Lu, & Sherbourne, 1994). Scores range from 0-100, and the higher the score on the SF-36 indicates less disability.

The PEQ was created to address the need for a comprehensive self-report tool for individuals with lower limb loss (Legro et al., 1998). The PEQ has 7 groups of questions; Group 1 covers general information of the patient's prosthesis, Group 2 covers specific bodily sensations, Group 3 covers social and emotional aspects of using a prosthesis, Group 4 covers ability to move around, Group 5 covers satisfaction with particular situations, Group 6 covers ability to do daily activities, and Group 7 covers how important different qualities of the prosthesis are to the patient. We chose to focus on Group 4 because it assesses ability to move around and we were specifically interested in patient's mobility. Group 4 contains 13 questions which self-assess the person's ability to move around in their prosthetic. Each question in Group 4 utilizes a visual analog scale that is 100 mm long from left to right with anchor phrases on each end of the line that describe the range (Cannot and No Problem). Answers are measured from the left end to the mark (Legro 1998). A higher total measurement on the visual analog scale for the whole section indicates greater ability to move around.

The FFABQ measures avoidance behavior in terms activity limitation and participation restriction related to fear of falling (Landers, Durand, Powell, Dibble, & Young, 2011). The outcome measure has a total of 14 questions, each using a 5-point Likert scale (anchors: 0=completely disagree to 4=completely agree), with a possible total of 56 points. A higher score indicates increased activity limitation and participation restriction due to fear of falling. The FFABQ has good overall test-retest reliability with an intraclass correlation coefficient of 0.81, and differentiates between subjects that were considered fallers and those that were not (Landers et al., 2011).

We created the Amputee Perception Survey to gather information on each patient's experience with physical therapy after undergoing a lower limb amputation. The survey includes questions about the patient's perception of safety (how safe do you feel when walking with your prosthesis 5-point Likert scale) and satisfaction with mobility (how satisfied are you currently with your mobility 7-point Likert scale) with their prostheses in 0-10 scales Left to right with descriptors of extremes (Ex. Safe to Not Safe,

Dissatisfied to Satisfied). The survey also asked if they received physical therapy after amputation; and if not, the reason.

Statistical Analysis

We used independent t-tests to compare the scores for patients with lower limb amputations that received physical therapy and those who did not receive physical therapy. IBM SPSS Statistics for Windows, Version 23.0 (IBM Corp., Armonk, NY, USA) was used to perform all statistical analyses.

RESULTS

Forty-eight people with lower limb amputation participated in this study. Most of our participants were male (83%) with a nonvascular (67%) cause of amputation. The level of lower limb amputation varied in our participant pool with above-the-knee (AK), and below-the-knee (BK) (Table 1). There were 38 participants who received physical therapy (YesPT) and 10 who did not (NoPT). There was no significant difference between the groups on demographic variables including sex, weight, height, and age. The mean age for the YesPT group was 59.5±15.1 years and 51.3±15.2 years for the NoPT group. YesPT group had an equal distribution of individuals with unilateral above the knee (AK; 42.1%) and below the knee (BK; 42.1%) amputations, and 15.8% of higher level (i.e. hip disarticulation) or bilateral amputations. The NoPT group had 10% AK and 90% BK amputations. A higher percentage of individuals in the YesPT group lost their limbs due to vascular causes than NoPT (36.8% vs 20%). There was no significant differences between groups on SF-36 Total, PEQ, FFABQ scores, and Amputee Perception Survey between the two groups ($p=0.115$; $p=0.907$; $p=0.208$; $p=0.128$; $p=0.653$, respectively) (Table 2).

Table 1. Characteristics of amputees who received and did not receive physical therapy after amputation

	Yes PT (n=38)	No PT (n=10)
Gender (M, %)	32, 84%	8, 80%
Weight (kg)	90.9±27.2	90.0±25.3
Height (cm)	173.7±8.7	177.6±11.0
Age (years)	59.5±15.1	51.3±15.2
Level of Amputation (AK/BK/Other)	16 (42.1)/ 16 (42.1)/ 6 (15.8)	1 (10.0)/9 (90.0)/ 0 (0.0)
Cause of Amputation (Vascular/Nonvascular)	14 (36.8)/ 24 (63.2)	2 (20.0)/ 7 (70.0)

M, male; F, female; AK, above-the-knee; BK, below-the-knee;
*Level of Amputation & Cause of Amputation represented in count (percent)

Table 2. PEQ Total, FFABQ Total, SF36-1 through SF36-11, SF36 Total, Subject safety during ambulation, Subject mobility satisfaction Yes/No PT

	Yes PT (n=38)	No PT (n=10)	p value
PEQ Total	86.3±32.1	85.0±29.5	0.907
FFABQ Total	13.2±14.8	7.0±7.5	0.208
SF36 Total	78.0±29.7	87.5±18.6	0.115
Perception of confidence of mobility	7.4±2.4	8.7±1.7	0.128
Perception of satisfaction of mobility	7.3±2.4	6.9±3.2	0.653

Specific reasons for not receiving physical therapy after amputation included subjects reporting too high of cost, lack of health insurance, or simply reporting “Did not need PT” (Table 3). The NoPT participants who reported not needing physical therapy did not have greater function (mean SF-36 score) when compared to those in the NoPT group. However, the NoPT participants who did not feel that they needed physical therapy did have higher mobility (mean PEQ) and less fear of falling avoidance (FFABQ scores). Those in the NoPT group who reported that they did not require physical therapy had a higher satisfaction with prosthetic mobility compared to others within the NoPT group. Finally, those who reported not having physical therapy due to financial reasons (too high of cost, or lack of health insurance) with economic issues had higher perceived confidence with their prostheses (9.50±0.70 versus 8.33± 2.1).

Table 3. Subgroup comparison for not receiving physical therapy after amputation

	Reported not needing PT (n=10)	Financial (n=10)
PEQ	91.4±31.6	70.6±44.8
FFABQ	7.2±9.2	4.5±44.8
SF-36	84.3±3.9	80.0±7.1
Perception of confidence of mobility	8.3±2.1	9.5±0.70
Perception of satisfaction of mobility	7.5±3.3	5.0±4.2

DISCUSSION

We observed that among patients who reported having physical therapy there was a greater proportion of individuals who had an above knee amputation than among those who reported having no therapy. We also observed that among patients who reported not having physical therapy, there was a greater proportion of them who had a below knee amputation. Although we found no significant difference between our YesPT and NoPT groups on our functional outcomes (SF-36 Total, PEQ, and FFABQ), the mean was lower on the PEQ and FFABQ among those in the NoPT group. It's likely that we are underpowered to detect a difference given our small sample size.

Other studies have shown that the level of amputation is related to mobility and quality of life (Davies & Datta, 2003). One study compared level of lower extremity amputations and mobility outcomes and found that among people with AK amputation, less than 25% achieved community mobility and less than 50% reached household mobility, while among those with BK amputation 50% achieved community mobility and 60% achieved household mobility (Davies & Datta, 2003). Another study compared Timed-Up-and Go test (TUG) times and 9 minute walk tests (9MWT) scores between AK and BK participants and found that AK participants needed more time to complete the TUG and walked a shorter distance in the 9MWT when compared to BK participants (Burger & Marinček, 2001). A third study found that among people who received inpatient physical therapy, those with BK amputations had better functional outcomes than those with AK amputations (Turney, Kent, Walker, & Loftus, 2001). It seems likely that among our patients, those who had a high level amputation (AK) would be at greater

risk for lower functional levels and decreased perceived outcome measure scores, thus could benefit more from physical therapy than those with lower level amputation (BK).

We found that all participants with bilateral amputations reported having had physical therapy following their amputation, which is unsurprising given what others studies shown. Akarsu et al. compared function and quality of life between those with a unilateral lower extremity amputation to those with bilateral lower extremity amputations and found that those with unilateral amputations scored higher on functional mobility tests (Houghton Scale, Six Minute Walk Test, and 10 Meter Walk Test). They also found that compared to people with unilateral amputation physical function, and physical and emotional role scores on the SF-36 were significantly lower in the bilateral amputation group (Akarsu et al., 2013).

We also found a higher percentage of participants with nonvascular causes of amputation received physical therapy when compared to participants with vascular caused amputation. This may indicate that people with vascular causes of amputation have greater functional limitation requiring physical therapy. Miller et al. compared confidence in balance of people with a nonvascular cause of amputation to those with a vascular cause of amputation (Miller, Speechley, & Deathe, 2002). They found that those with vascular causes of amputation scored lower on every scale of the Activities-specific Balance Confidence scale, meaning that participants with vascular causes of amputation have less confidence in balance than their counterparts (Miller et al., 2002). In another study, people with and without a vascular cause for their amputation were compared for balance and mobility (Burger & Marincek, 2001). Those with amputations due to trauma (nonvascular cause) had longer single-leg-stance time on their sound limb, walked longer distance in the 9MWT, and had faster TUG times than those with amputations due to peripheral vascular disease (vascular cause) (Burger & Marinček, 2001).

In our study, the level of amputation, if it was bilateral or unilateral, and the cause of amputation (vascular vs. nonvascular) were associated with receiving physical therapy, overall mobility, and quality of life. The trend in our data regarding a greater proportion of AK amputees receiving physical therapy may suggest AK amputees have worse initial function when compared to BK amputees, requiring physical therapy to reach their functional goals. This also appears to be the case when comparing bilateral

and unilateral amputees, and with vascular and nonvascular causes of amputation, where bilateral amputees and those with vascular causes of amputation have worse functional outcomes.

Our observations of patient characteristics associated with increased use of physical therapy after amputation have been seen in previous studies (Davies & Datta, 2003). One such study focused on mobility among amputees with vascular and nonvascular causes. They found that amputees with nonvascular causes had higher levels of participation in household and community activities (Davies & Datta, 2003). Another study investigated factors that predict walking with a prosthesis among lower limb amputees (Sansam, Neumann, O'Connor, & Bhakta, 2009). In that study unilateral and more distal amputation were predictive of better walking ability (Sansam et al., 2009); we observed similar findings.

Among our subjects, those that received physical therapy had similar outcomes compared to those that did not receive physical therapy. However, if we compare our subjects that reported not having physical therapy because they thought they did not need it, to those that did not have the financial means to do so, we observed that those with financial limitations could have benefited from physical therapy but were unable to receive it. According to a study examining the utilization of physical therapy among people with lower extremity trauma treated by reconstruction or amputation, patients reported that financial constraints were the most important reasons for not receiving physical therapy (Castillo, MacKenzie, Webb, Bosse, & Avery, 2005). They also reported that a significant proportion of patients that felt they needed physical therapy did not receive it (Castillo et al., 2005). It may be that within our NoPT group, those that did not receive physical therapy due to financial reasons had lower *initial* levels of mobility and perceived function, but we only collected data 6-months after amputation (Castillo et al., 2005). It is also possible that if subjects in the YesPT group did not receive physical therapy services, they would be at similar levels of mobility and function as those who did not receive such services due to financial limitations. More prospectively conducted studies are needed to answer these questions.

LIMITATIONS/FUTURE STUDIES

One limitation in our study is the disadvantages that accompany self-reported outcomes (Gonyea, 2005). We have focused on outcome measures that are subjective and therefore mainly rely on the individual's ability to provide accurate and relevant information. Self-reported data suffer from at least two issues: social desirability bias, the desire to edit a response before submitting it to the researcher in order to make the response more desirable, and is highly dependable on context, nature of the question and social situation of participants; and halo error, the tendency to provide consistent evaluations of certain items based on a general perception of the subject (Gonyea, 2005). These have the potential to compromise validity and reliability, muddy the relationships among variables and ultimately reduce the likelihood that meaningful conclusions can be drawn from a study (Gonyea, 2005). Another limitation of our study is the cross-sectional design. An important shortcoming of a cross-sectional design is differentiating cause and effect from simple association (Mann, 2003). It is possible to miss an accurate explanation for an association that was inferred by the data because of the findings may not be clear. It is also important to consider our overall small sample size of the NoPT group and the very large standard deviation for FFABQ scores among our YesPT group. The FFABQ standard deviation exceeds the minimal detectable change of the FFABQ which is 14.69 (Landers et al., 2011). Lastly, participants qualified for our study only if it had been more than six months since their amputation. It is possible that many of them had already adjusted to their condition and reached a plateau in their recovery. Physical therapy has an effect on how fast individuals can improve, so future studies collecting data on patients longitudinally could provide a more complete view of the effects of physical therapy (Dillingham & Pezzin, 2008).

CONCLUSION

This study was performed to compare functional outcomes regarding quality of life, mobility, and fear of falling avoidance behavior between individuals with limb loss who received physical therapy to those who did not receive physical therapy following limb loss as well as indicate similarities and differences of our patients' confidence and satisfaction of their mobility with their prostheses. We

observed no statistically significant differences between our YesPT and NoPT groups, and for confidence and satisfaction of patient mobility, but were able to identify trends within the data including a greater proportion of individuals with AK, bilateral amputation, and vascular caused limb loss requiring physical therapy versus individuals with BK, unilateral amputation and non-vascular caused limb loss that did not; we identified that individuals with limb loss that were vascular caused and those with bilateral amputations reported worse outcome measures compared to their counterparts.

REFERENCES

Ahmad, N., Thomas, G. N., Gill, P., & Torella, F. (2016). The prevalence of major lower limb amputation in the diabetic and non-diabetic population of England 2003-2013. *Diab Vasc Dis Res, 13*(5), 348-353. doi:10.1177/1479164116651390

Akarsu, S., Tekin, L., Safaz, I., Göktepe, A. S., & Yazıcıoğlu, K. (2013). Quality of life and functionality after lower limb amputations: comparison between uni-vs. bilateral amputee patients. *Prosthetics and orthotics international, 37*(1), 9-13.

Amputee-Coalition. (2015). Resources and news for amputees, amputation, limb loss, caregivers and healthcare providers.

Beattie, P. F., Pinto, M. B., Nelson, M. K., & Nelson, R. (2002). Patient satisfaction with outpatient physical therapy: instrument validation. *Physical therapy, 82*(6), 557-565.

Burger, H., & Marinček, Č. (2001). Functional testing of elderly subjects after lower limb amputation. *Prosthetics and orthotics international, 25*(2), 102-107.

Castillo, R. C., MacKenzie, E. J., Webb, L. X., Bosse, M. J., & Avery, J. (2005). Use and perceived need of physical therapy following severe lower-extremity trauma. *Archives of physical medicine and rehabilitation, 86*(9), 1722-1728.

Davies, B., & Datta, D. (2003). Mobility outcome following unilateral lower limb amputation. *Prosthetics and orthotics international, 27*(3), 186-190.

Dillingham, T. R., & Pezzin, L. E. (2008). Rehabilitation setting and associated mortality and medical stability among persons with amputations. *Archives of physical medicine and rehabilitation, 89*(6), 1038-1045.

Gine-Garriga, M., Roque-Figuls, M., Coll-Planas, L., Sitja-Rabert, M., & Salva, A. (2014). Physical exercise interventions for improving performance-based measures of physical function in community-dwelling, frail older adults: a systematic review and meta-analysis. *Arch Phys Med Rehabil, 95*(4), 753-769.e753. doi:10.1016/j.apmr.2013.11.007

Gonyea, R. M. (2005). Self□reported data in institutional research: Review and recommendations. *New directions for institutional research, 2005*(127), 73-89.

Hush, J. M., Cameron, K., & Mackey, M. (2011). Patient satisfaction with musculoskeletal physical therapy care: a systematic review. *Physical therapy, 91*(1), 25-36.

Ites, K. I., Anderson, E. J., Cahill, M. L., Kearney, J. A., Post, E. C., & Gilchrist, L. S. (2011). Balance interventions for diabetic peripheral neuropathy: a systematic review. *J Geriatr Phys Ther, 34*(3), 109-116. doi:10.1519/JPT.0b013e318212659a

Kluding, P. M., Bareiss, S. K., Hastings, M., Marcus, R. L., Sinacore, D. R., & Mueller, M. J. (2017). Physical Training and Activity in People With Diabetic Peripheral Neuropathy: Paradigm Shift. *Phys Ther, 97*(1), 31-43. doi:10.2522/ptj.20160124

Landers, M. R., Durand, C., Powell, D. S., Dibble, L. E., & Young, D. L. (2011). Development of a scale to assess avoidance behavior due to a fear of falling: the fear of falling avoidance behavior questionnaire. *Physical therapy, 91*(8), 1253-1265.

Legro, M. W., Reiber, G. D., Smith, D. G., Del Aguila, M., Larsen, J., & Boone, D. (1998). Prosthesis evaluation questionnaire for persons with lower limb amputations: assessing prosthesis-related quality of life. *Archives of physical medicine and rehabilitation, 79*(8), 931-938.

Mann, C. (2003). Observational research methods. Research design II: cohort, cross sectional, and case-control studies. *Emergency medicine journal, 20*(1), 54-60.

McHorney, C. A., Ware Jr, J. E., Lu, J. R., & Sherbourne, C. D. (1994). The MOS 36-item Short-Form Health Survey (SF-36): III. Tests of data quality, scaling assumptions, and reliability across diverse patient groups. *Medical care*, 40-66.

Miller, W. C., Speechley, M., & Deathe, A. B. (2002). Balance confidence among people with lower-limb amputations. *Physical therapy, 82*(9), 856-865.

Pezzin, L. E., Padalik, S. E., & Dillingham, T. R. (2013). Effect of postacute rehabilitation setting on mental and emotional health among persons with dysvascular amputations. *PM&R, 5*(7), 583-590.

Sansam, K., Neumann, V., O'Connor, R., & Bhakta, B. (2009). Predicting walking ability following lower limb amputation: a systematic review of the literature. *Journal of rehabilitation medicine, 41*(8), 593-603.

Sauter, C. N., Pezzin, L. E., & Dillingham, T. R. (2013). Functional outcomes of persons undergoing dysvascular lower extremity amputations: effect of a post-acute rehabilitation setting. *American journal of physical medicine & rehabilitation/Association of Academic Physiatrists, 92*(4), 287.

Shumway-Cook, A., Gruber, W., Baldwin, M., & Liao, S. (1997). The effect of multidimensional exercises on balance, mobility, and fall risk in community-dwelling older adults. *Phys Ther, 77*(1), 46-57.

Sottile, P. D., Nordon-Craft, A., Malone, D., Schenkman, M., & Moss, M. (2015). Patient and family perceptions of physical therapy in the medical intensive care unit. *Journal of critical care, 30*(5), 891-895.

Stevens-Lapsley, J. E., Loyd, B. J., Falvey, J. R., Figiel, G. J., Kittelson, A. J., Cumbler, E. U., & Mangione, K. K. (2016). Progressive multi-component home-based physical therapy for deconditioned older adults following acute hospitalization: a pilot randomized controlled trial. *Clin Rehabil, 30*(8), 776-785. doi:10.1177/0269215515603219

Stewart, C., Jain, A., & Ogston, S. (1992). Lower limb amputee survival. *Prosthetics and orthotics international, 16*(1), 11-18.

Turney, B., Kent, S., Walker, R., & Loftus, I. (2001). Amputations: no longer the end of the road. *Journal of the Royal College of Surgeons of Edinburgh, 46*(5), 271-273.

Varma, P., Stineman, M. G., & Dillingham, T. R. (2014). Epidemiology of limb loss. *Phys Med Rehabil Clin N Am, 25*(1), 1-8. doi:10.1016/j.pmr.2013.09.001

Ware Jr, J. E., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical care*, 473-483.

World-Health-Organization. (2013). *Diabetes*. Retrieved from http://www.who.int/: http://www.who.int/medicines/areas/priority_medicines/Ch6_4DM.pdf

Ziegler-Graham, K., MacKenzie, E. J., Ephraim, P. L., Travison, T. G., & Brookmeyer, R. (2008). Estimating the prevalence of limb loss in the United States: 2005 to 2050. *Arch Phys Med Rehabil, 89*(3), 422-429. doi:10.1016/j.apmr.2007.11.005

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- Family and Sports Physical Therapy. Las Vegas, NV. Outpatient Care. Jan-Mar 2019.
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- UNLV Physical Therapy Doctoral Student Research Presentations. May 2017, 2018, 2019.
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- Sunrise Medical Hospital. Las Vegas, NV. Inpatient Acute Care. September – December 2018.
- United States Air Force 58th Rescue Squadron – Human Performance Optimization, Nellis AFB, Las Vegas, NV. January – March 2019.

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- Sunrise Hospital and Medical Center. Las Vegas, NV. Outpatient/Inpatient Pediatric Care. Jan-March 2019.
- Life Care Center of Las Vegas. Las Vegas, NV. Acute Rehabilitation Care. Oct- Dec 2018.
- Spring Valley Hospital. Las Vegas, NV. Inpatient Acute Care. July- Sep 2018.
- Concentra Medical Center. Las Vegas, NV. Outpatient Care. July- Aug 2017.

Professional Experience

- UNLV Physical Therapy Doctoral Student Research Presentations. May 2017, 2018, 2019.
- In-Service presentation on Pediatric gait and associated impairments. March, 2019.
- Team Concept Conference, Sports Physical Therapy Section. December 2017.
- Combined Section Meeting (CSM) in San Antonio, TX. Feb 2017.
- American Physical Therapy Association (APTA) Membership. 2016- Current.
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- American Heart Association- CPR/AED Certification. May 2019.

Research Experience

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Work Experience

- Select Physical Therapy – Durango. Las Vegas, NV. Outpatient Care. Jan-Mar 2019.
- Southern Hills Hospital. Las Vegas, NV. Acute Care. Oct-Dec 2018.
- Spring Valley Hospital. Las Vegas, NV. Inpatient Rehab Care. July-Sept 2018.
- Renown Health Physical Therapy and Rehab. Reno, NV. Outpatient Care. July-Aug 2017.

Professional Experience

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- American Heart Association-CPR/AED Certification. May 2019.
- Nevada Physical Therapy Association Meeting: "NeuroRestorative Brain Injury 101". September 2017.
- Combined Sections Meeting (CSM)-San Antonio, TX. Feb 2017.
- Distinguished Lecture Series "Past, Present, and Future of Neurologic Physical Therapy". November 2016.

Research Experience

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