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The Influence of Socioeconomic Factors on Fear of Falling and Mobility Outcomes after Lower Limb Loss: a Preliminary Study

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INFLUENCE OF SOCIOECONOMIC FACTORS ON FEAR OF FALLING AND MOBILITY
OUTCOMES AFTER LOWER LIMB LOSS: A PRELIMINARY STUDY

By

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

Doctor of Physical Therapy

Department of Physical Therapy

School of Allied Health Sciences

Division of Health Sciences

The Graduate College

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Influence of Socioeconomic Factors on Fear of Falling and Mobility Outcomes after
Lower Limb Loss: A Preliminary Study

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

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ABSTRACT

Background and Purpose: Current research has revealed that as much as 52.4% of individuals with lower limb loss report falling at least once in the past year. Previous research has also indicated that rehabilitation, including physical therapy (PT), generally improves patient outcomes after definitive amputation. Socioeconomic status has been shown to be an important factor in accessing healthcare but has yet to be investigated in this population. The purpose of this study was to investigate the effects of socioeconomic status and access to PT, and how limb loss affects mobility and fear of falling perception. We hypothesized: [1] individuals with socioeconomic difficulty would have reduced access to PT after amputation, and [2] individuals with limb loss will have increased fear of falling and decreased mobility performance when compared to non-amputee, age-matched controls.

Subjects: 23 participants (7 females, 16 males) mean age 51.30 years old (+ 13.17 SD, range 22-70) with lower limb loss ambulating with a definitive prosthesis.

Materials/Methods: Participants completed a survey that included the Fear of Falling Avoidance Behavior Questionnaire (FFABQ), questions to determine their socioeconomic status, and whether they received PT after amputation. Mobility outcomes were measured using the standardized Timed Up and Go test (TUG) and the Six Minute Walk Test (6MWT).

Results: There was no statistically significant difference in access to PT after amputation between those with and without financial difficulty ($p=.354$). However, 75% of participants who had no socioeconomic difficulty reported receiving PT, in comparison to only 25% in those who had socioeconomic difficulty. Additionally, 34.8% of our participants reported socioeconomic difficulties. When comparing the participants with amputation to the non-amputee, age-matched controls, there was a significant difference in the TUG ($p<.001$), 6MWT ($p<.001$), and FFABQ ($p=.008$). On average, participants with limb loss were 4.4 seconds slower on the TUG, walked 136.4m less on the 6MWT, and had an increased FFABQ

score of 6.6 points out of 56 points.

Discussion: Access to physical therapy and socioeconomic status have been overlooked in current literature for individuals after amputation. While the effect of socioeconomic status on PT access did not reach statistical significance in this preliminary study, only 25% of those who reported socioeconomic difficulty received physical therapy after amputation, compared to 75% in those who reported no difficulty. Further research is needed to determine whether low socioeconomic status is predictive of receiving rehabilitation services post-amputation and long-term outcomes. Our findings also showed that when compared to age-matched non-amputees, amputees tend to have impaired mobility and higher degree of fear of falling. These findings agree with current literature.

Conclusion: Although not statistically significant, our preliminary findings showed that socioeconomic difficulty may affect access to physical therapy after amputation. Furthermore, our data demonstrated that individuals with lower limb loss exhibit reduced mobility performance and increased fear of falling when compared to the age-matched controls.

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INTRODUCTION

Research has showed that individuals with lower extremity loss ambulating with a prosthesis are at greater risk for falls.¹ A previous study by Miller et al. has revealed that as many as 52.4% of individuals with lower extremity amputation report falling at least once in the past year.¹ Approximately two-thirds of those who had fallen reported falling twice or more.¹ In addition, 40.4% of all reported falls resulted in injuries, with 19.3% of them requiring medical attention.¹ Consequently it is no surprise that fear of falling has been shown to be quite prevalent in this population with 49.2% of individuals with lower limb loss report that they have a fear of falling, compared to 40% of individuals without an amputation in the same age group.¹ The fear of falling reported by this population can lead to avoidance behaviors, which can then further hinder mobility and participation in the community.^{1,2} Furthermore, balance confidence within the amputee population is significantly lower when compared to an age-matched control group.² In a study that investigated falls in younger amputees (ages 18-44), 87.5% of the falls that resulted in hospitalization occurred within the first 6 months following definitive amputation.³ Furthermore, there was a significant increase in risk of rehospitalization with increased age.³ These findings demonstrate the crucial need of physical therapy, emphasizing gait training, fall prevention and safe transfer strategies, and other interventions to be delivered early in order to optimize patient's mobility and to increase safety.

Socioeconomic status, comorbidities, and access to health care are important factors that may be contributing to the decreased mobility and fear of falling seen in this population. A previous study has also shown that those with an amputation that have a higher income (>\$40,000), exhibit a much lower fear of falling (58% reduction) when compared to those with lower income.¹ Additionally, comorbidities that can significantly increase the likelihood of lower limb amputation such as diabetes mellitus has been shown to be strongly tied to socioeconomic factors. Gaskin et al. identified low socioeconomic status as well as living in high-poverty neighborhoods with inadequate access to

recreational facilities and health care services as key risk factors for type 2 diabetes.⁴ Uncontrolled diabetes mellitus can lead to peripheral neuropathy in one out of four individuals with diabetes.⁵ a condition that impairs the body's healing and sensation abilities and is a precursor to amputation. Persons with diabetes are 8 times more likely to require amputation.⁶ It is safe to say that without the necessary resources and access to healthcare, the diabetic condition of many of those living in poverty could ultimately result in limb loss and have adverse effects in the recovery from lower limb amputation.

In the United States, individuals with low socioeconomic status make up two-thirds of the nation's uninsured,⁷ with uninsured Americans having significantly higher mortality rates than individuals with private insurance. Uninsurance was also found to be associated with prevalence of smoking and lower self-rated health.⁸ Baker et al identified that middle age adults who were continuously uninsured were much more likely than those who were continuously insured to experience a major decline in their overall health and overall mobility. It is well known that healthcare and access to healthcare in this nation is a very sensitive topic, however, the effects of the lack of access to healthcare are evident, and further research in specific populations is essential.

Traditionally, when an individual is fitted for a prosthesis following amputation, they are seen by a prosthetist who evaluates the fit and educate the patient regarding the application and removal of the device. Although prosthetists are involved in this process, it is not always the case for physical therapists, whose services are not always prescribed to individuals after lower limb loss. Previous study has shown that prosthetists are not confident in administering standardized mobility outcome measures such as the TUG and the 6 minute walk test, two fundamental outcome measurements of mobility and fall risk, to assess the patient's fall risk.⁹ Although the role of prosthetists is absolutely essential, physical therapists are also crucial as they receive extensive training in functional outcome measures, safe transfers, gait analysis and training. This also highlights some of the differences in roles between prosthetists and

physical therapists that, although different, should complement each other in every well-rounded post-amputation program.

Physical therapy is necessary and critical to the continuum of care for individuals with lower extremity amputation. Early physical therapy such as range of motion (ROM) exercise, bed mobility and positioning of both limbs are important to patient functions and the prevention of other complications. Prosthetic training in amputee rehabilitation is a long process that involves functional movement training and strengthening to help facilitate activities such as standing, maintaining balance, and walking with the prostheses. A retrospective study by Christiansen et al. has demonstrated that gait training with the prosthesis increases distance and speed significantly. Participants in their study exhibited statistically significant improvement from the initial test to discharge in 2 Minute Walk, Timed Up and Go, and Gait Speed outcomes. Furthermore, a study by Sjordahl et al. has shown that a combination of psychological and physiotherapeutic treatment can lead to considerable gait improvements in this population. The authors noted that participants in the study exhibited a decrease in compensatory gait pattern and an increase in gait speed by 20-79%. Participants also reported an increased control of the prosthesis, freedom, self-confidence, and quality of life.¹⁰

Current research shows that fear of falling and diminished mobility are prevalent in individuals with lower limb loss. The available clinical evidence supports the notion that early access to physical therapy intervention significantly improves mobility in those with lower extremity amputation. However, it is currently unclear how socioeconomic status affects physical therapy services accessibility post-amputation. The overall purpose of this study was to investigate the effects of an individual's socioeconomic status, physical therapy treatment in prosthetic training, and accessibility of physical therapy on mobility in individuals with lower extremity amputation. The following specific aims and corresponding hypotheses were examined and tested in this study.

Project Aims and Hypothesis

1. Aim 1: Investigate the effects of socioeconomic status on access to physical therapy in individuals with lower extremity limb loss.

Hypothesis #1: Individuals with socioeconomic difficulty will have reduced access to physical therapy services after amputation when compared to those with no difficulty.

2. Aim 2: Compare mobility and fear of falling between age-matched individuals with and without lower extremity amputation.

Hypothesis #2: Individuals with lower limb loss will have increased total time for the TUG test, decreased total distance for the 6MWT, and increased score in Fear of Falling Avoidance Belief Questionnaire in comparison to non-amputee, age-matched control group.

METHODS

Subject and Instrumentation

Twenty-three participants with lower limb loss volunteered to participate in this study. Most of them were referred from local prosthetics and orthotics clinics, while others were recruited from a patient support group (Amputee Coalition of Southern Nevada). In order to participate in our study, eligible participants had to be at least 18 years of age and have had a unilateral or bilateral lower limb loss, regardless of level of amputation. Participants were required to currently be using a lower limb prosthesis for ambulation and to walk independently for at least 50 meters without help from others with or without using assistive devices. Participants that did not meet these criteria were excluded from the study. The entire process took approximately 45-60 minutes. The age-matched control group for this study consisted of mobility data collected from a previous study that utilized the same instrumentation and functional outcomes in community-dwelling older adults without amputation.

Procedure

Informed consent was collected from each subject prior to data collection. Each subject was informed of their right to withdraw from the study at any time, for any reason without penalty. Each subject filled out a survey that included a medical history and other health-related questionnaires. The survey is detailed below.

Functional Mobility and Physical Therapy Exposure Questionnaires

Participants completed three standardized questionnaires: The Short-Form Health Survey (SF-36v2), the Fear of Falling and Avoidance Belief Questionnaire (FFABQ), and Section 4 of the Prosthesis Evaluation Questionnaire (PEQ). Mobility and PT access-related questions were included in order to determine participants' exposure to gait training and physical therapy. These specific questions are as follows:

1. Did you receive any training (walking, putting it on/removing) for your prosthesis since your amputation?
2. Did you receive any physical therapy (PT) training to help you with your prosthesis (walking, fall education, perform daily and recreational activities)?
3. If yes, how soon after you received your prosthesis did you receive this PT training?
4. How often and for how long did you receive this PT training?

The Short-Form Health Survey (SF-36v2) gathered general information about the subject's demographic and medical history.¹¹ The Fear of Falling and Avoidance Behavior Questionnaire (FFABQ) is a subjective assessment of a person's fear of falling during certain activities.¹²

The Prosthesis Evaluation Questionnaire (PEQ) is another valuable functional outcome measure. It is a self-reported questionnaire that contains 54 questions divided into nine different functional sections. It contains questions about a person's prosthesis as it relates to its effects on quality of life, mobility, satisfaction and psychosocial aspects. Each one of the nine functional domain scales can be used individually or in different combinations for specific purposes. This questionnaire has been shown to have a high degree of content validity and temporal stability.¹³ For the purpose of this study, our domain of interest was mobility. Thus, only section 4 of the PEQ was utilized.

Socioeconomic Status

Our survey included a simple socioeconomic question that has been shown to be 98% sensitive for detecting people living below poverty line:¹⁴

1. Do you ever have difficulty making ends meet at the end of the month?

After completing the questionnaires, the subject's height and weight were collected followed by mobility assessments.

Mobility Assessments

The functional outcome measures included the Timed-Up-and-Go (TUG) test and the Six-Minute

Walk Test. TUG time was measured using an instrumented TUG bench and procedures validated in a previous study by Lee et al. Briefly, the bench is equipped with force sensors that detects the loading exerted to the seat. The start of timing was determined when 90 percent of the subject's body weight is off the bench and stops when 90 percent of the body weight was returned to the bench when the participant sat down.

For the TUG, participants were asked to perform the TUG test in 2 walking distances (3 and 9 meters) consisting of 3 trials each. The bench height of the instrumented TUG bench was adjusted according to the individual's leg length for the most reliable results. It has been shown that this height adjustment is particularly important for taller individuals.¹⁵ Leg length was determined based on the popliteal crease to the bottom of their shoe using their uninvolved leg if amputation was unilateral. If amputation was bilateral, measurement of the right prosthesis was collected. In the event that the subject could not arise from the bench unassisted at that height, bench height was adjusted and recorded in order for the successful completion of the test. A demonstration trial was performed by a researcher so the subject understood what was expected of them during the task followed by a practice trial. Participants were instructed to sit on the bench, and when cued with "ready?, go" they will get up from the bench, walk at a safe but brisk walking pace toward a target at the designated distance, turn around, walk back to the bench and sit down. The total time was recorded from the moment they arose from the bench to when they sit back down, as previously discussed.

For the Six Minute Walk Test, participants instructed to cover as much ground as possible within the 6 minutes along a designated marked straight walkway with a distance of 33 meters (100 ft.). A trained researcher followed the participants throughout the process to walk continuously and as far as possible according to a validated standardized procedure. Participants were informed that it is acceptable if they are unable to continue or begin to slow down and they may take breaks to rest if necessary.

Reliability of the Outcomes Used in Current Research

Intraclass correlation coefficients (ICCs) for the following tests are established:

1. Administration of Timed-Up-and-Go test for the investigator in this study= 0.985.
2. PEQ mobility/ambulation= .90.¹⁶
3. SF-36= 0.689-0.972.¹¹
4. Six Minute Walk Test younger population: 0.89-0.96;¹⁷ older populations:0.88-0.97.¹⁸
5. FFABQ=0.812.¹⁹

STATISTICAL ANALYSIS

To investigate the effect of socioeconomic status on mobility, independent sample t-tests were utilized to compare the variables of interest between those who reported no socioeconomic difficulty vs those who had socioeconomic difficulty. Furthermore, to investigate the effect of socioeconomic status on physical therapy access, we compared the percentage of individuals who received physical therapy intervention between those with and without economic hardship using a chi-square analysis.

To investigate the influence of physical therapy intervention after amputation, independent sample t tests were used to compare the variables of interest between those who received and did not receive physical therapy. To further investigate the effect of amputation on mobility, an independent t-test was performed to compare performance on the average 3 meter TUG time, 9 meter TUG time, 6 Minute Walk Test, and Fear of Falling and Avoidance Belief Questionnaire between amputee participants and age-matched controls (age 50-70). Additional t-tests were performed to analyze subgroups within this subject population (ages 50-59 and 60-70).

RESULTS

Demographic, anthropometric, and amputation characteristics of the participants are presented in Table 1. Additionally, Table 2 shows our results in regard to socioeconomic impact on TUG, 6MWT, FFABQ, and PEQ. There was no statistically significant difference between individuals with and without socioeconomic difficulty in any of these measures. Table 3 presented results from our chi square analysis; of note 34.8% of the individuals with limb loss reported socioeconomic difficulties, of them, only 25% received PT after amputation when compared to 75% in those who reported no socioeconomic difficulty (Fisher's Exact Test, $p=0.354$; 2-sided). Table 4 presented the comparison between individuals who received physical therapy and those who did not in regard to their performance in the TUG, 6MWT, FFABQ, and PEQ. We found no significant difference between groups that received physical therapy intervention compared to those that didn't received physical therapy intervention when compared within 3m Tug. Lastly, Table 5 examines the older amputee participants age 50-70 and compared them to age match controls. We found a statistically significant difference in 3m TUG (50-70 year old amputee group = 11.84 ± 5.46 , 50-70 year old control group = 7.37 ± 2.37 ; $t(164)=5.70$, $p<.001$ (two tailed)), 9m TUG (50-70 year old amputee group = 23.03 ± 9.10 , 50-70 year old control group = 14.74 ± 4.37 ; $t(148)=5.80$, $p<.001$ (two tailed)), FFABQ (50-70 year old amputee group = 12.69 ± 10.27 , 50-70 year old control group = 6.06 ± 8.46 ; $t(164)=2.67$, $p=.008$ (two tailed)) and 6MWT (50-70 year old amputee group = 374.79 ± 208.68 , 50-70 year old control group = 511.21 ± 79.06 ; $t(91)=-4.32$, $p<.001$ (two tailed)) between the older amputee participants age 50-70 years old and control subjects age 50-70 years old.

Table 1

Demographic and anthropometric characteristics of the participants

Characteristics	Male (n=16)	Female (n=7)
Age (y)	50.69±12.89	52.71±13.69
Height (m)	1.81±0.12	1.69±0.07
Body Mass (kg)	98.63±18.82	85.80±24.16
BMI (kg/m ²)	30.07±4.86	29.85±7.86
Bilateral Amputation	2	0
Unilateral Amputation	14	7
Transfemoral Amputation	2	4
Transtibial Amputation	14	2
Hip Disarticulation	0	1

Table 2

Socioeconomic difficulty and its effect on mobility, FFABQ, and PEQ

Socioeconomic Difficulty	TUG 3m Average (s)	TUG 9m Average (s)	6MWT Average (m)	FFABQ Score Average	PEQ Score Average
Yes (n=8)	11.31 ± 5.91	20.93 ± 9.88	328.19 ± 117.11	15.00 ± 10.06	61.91 ± 23.25
No (n=14)	10.02 ± 4.15	20.01 ± 7.18	432.76 ± 190.94	10.13 ± 13.46	72.39 ± 23.13
p value	0.554	0.804	0.178	0.381	0.313

FFABQ and PEQ Socioeconomic Difficulty “no” (n=15)

Table 3

Chi square analysis: Physical Therapy and Socioeconomic Difficulty Crosstabulation

	No Socioeconomic Difficulty	Yes Socioeconomic Difficulty
Did not receive Physical Therapy	3 (20%)	4 (50%)
Received Physical Therapy	12 (80%)	4 (50%)
Total	15 (100%)	8 (100%)

Fisher’s Exact Test p=0.354

Table 4

Physical Therapy intervention and its effect on mobility, FFABQ, and PEQ.

Attended Physical Therapy	TUG 3m Average (s)	TUG 9m Average (s)	6MWT Average (m)	FFABQ Score Average	PEQ Score Average
Yes (n=15)	10.24 ± 4.11	20.02 ± 6.99	416.99 ± 192.17	10.69 ± 13.52	67.32 ± 24.43
No (n=7)	11.02 ± 6.30	21.02 ± 10.56	347.04 ± 119.20	14.43 ± 9.66	72.01 ± 21.56
p value	0.728	0.794	0.310	0.463	0.666

FFABQ and PEQ Attended Physical Therapy “yes” (n=16)

Table 5

Age-matched mobility and FFABQ comparison between amputee and control subjects

Outcome Measure	TUG 3m Average (s)	TUG 9m Average (s)	6MWT Average (m)	FFABQ Average Score
50-70 years Amputee (n=13)	11.84 ± 5.46*	23.03 ± 9.10*	374.79 ± 208.68*	12.69 ± 10.27*
50-70 Control (n=80-153)	7.37 ± 2.37	14.74 ± 4.37	511.21 ± 79.06	6.06 ± 8.46

TUG 3m 50-70 Control (n=153), TUG 9m 50-70 Control (n=137), 6MWT 50-70 Control (n=80), FFABQ 50-70 Control (n=153)

*significant difference

DISCUSSION

Physical therapy post-amputation improves overall gait performance and shortens the duration of time to regain independent ambulation,^{20, 21} which in turn contribute to decreased incidence of falls.

Physical therapy has been shown to reduce time in inpatient rehab length of stay and to initial prosthetic casting, accelerating the process to independence.²¹ Physical therapists also play a vital role in prosthetic training in amputee rehabilitation, which is a long process that involves functional movement, strengthening, and other techniques to promote balance, gait and quality of life, and to prevent secondary complications such as joint contracture, back pain, and falls. While physical therapy is clearly beneficial after amputation, access to proper healthcare is limited due to a myriad of factors such as socioeconomic status, lifestyle choices, and level of education. In addition to a lack of insurance coverage, several factors have been shown to predict inadequate medical care such as living in rural areas,²² minority race, and lack of higher education.^{23,24}

Results of previous literature highlight the importance of accessible healthcare and its effects on health. A study in particular by Leavitt determined a direct correlation between poverty and access to comprehensive, effective, and efficient medical care.²⁵ We hypothesized that participants in our study with socioeconomic difficulty undergoing rehabilitation after amputation would have diminished outcomes than those with no difficulty. To our surprise, 30% of our participants did not participate in physical therapy after amputation even though a majority of them reported no socioeconomic difficulty. The exact reasons individuals with lower limb loss chose not to undergo PT after amputation are unclear. We speculate there is a possibility of a lack of awareness of the role physical therapy has in rehabilitation among the general public, especially post-operatively in an acute care setting. Additionally, poor intrinsic motivation, family support, transportation and perception of physical therapy could contribute to subjects stating they did not receive PT services. Future research should investigate the reason as to why PT

services are not readily implemented in the amputee plan of care along with perceived limitations to participate in physical therapy.

Our research failed to demonstrate statistically significant effects of socioeconomic difficulty and on our main mobility outcome measures. This result is likely due to the limited sample size in this preliminary study. However, some trends seem to exist in the TUG, 6MWT, FFABQ, and PEQ scores between groups. We found that amputees who reported socioeconomic difficulty, on average, were 2 seconds slower in completing the TUG at 3m and 9m distance. As for the 6MWT, these participants walked on average, 74 meters less which is greater than the minimal clinically important difference (MCID) of 50 meters established for the geriatric population.²⁶ FFABQ scores were on average 5 points higher in those with socioeconomic difficulty indicating an increased fear avoidance behavior, along with lower PEQ scores, which suggest greater dissatisfaction with their prosthesis in regards to their perceived mobility.

Our preliminary results showed that socioeconomic status appears to have an impact on whether or not an individual with limb loss receives physical therapy after amputation. Based on table 3, the probability of receiving physical therapy after amputation in those without economical difficulty (12 out of 15, 80%) was 1.6 times higher than those with economical difficulty (4 out of 8, 50%). However, our hypotheses that early physical therapy and socioeconomic status would impact their mobility and fear of falling outcome measures were not supported. Future studies should consider the level of higher education in addition to socioeconomic status as additional factors determining whether an individual will undergo physical therapy after amputation. It is imperative for future research to further investigate some of the barriers to healthcare access in this specific population and to investigate why there seems to be a disparity in healthcare access between those who have socioeconomic hardships and those who do not.

In regard to the impact of receiving physical therapy after amputation, amputees who did not

receive therapy, completed the TUG at 3m and 9m distance on average, 1 second slower than their counterparts. Furthermore, participants who did not attend physical therapy ambulated on average 69 meters less in the 6MWT, thus surpassing the MCID of 50 meters as defined by Perera et al. Lastly, participants who did not receive physical therapy on average scored 3 points greater on the FFABQ in comparison to those who did receive physical therapy, which is concurrent with our hypothesis. We believe this can be attributed to various factors but not limited to poor prosthetic fit, impaired kinematics, and decreased endurance.

Lastly, we discovered a significant difference in FFABQ scores, TUG and 6MWT between individuals with amputations ages 50-70 years of age when compared to those in the age-matched control group. These results, while consistent with current evidence highlight a distinctive susceptibility to the development of avoidance behaviors due to fear of falling in this specific age group. As healthcare providers, it is imperative to be aware of this risk in order to address it early through education and physical therapy interventions in order to maximize mobility and the quality of life in those with lower limb loss. Increased fear of falling and lower 6MWT in the 50+ age group when compared to those without amputation is concurrent with current findings.

LIMITATIONS

There might be a few reasons why we were not able to demonstrate a statistically significant difference on physical therapy accessibility between those who reported having socioeconomic difficulty and those who did not. The first reason is that our sample size is small. A number of previous studies utilized healthcare databases and hence have a larger sample compared to ours, which involved additional assessments. Second, recruitment of participants relied on referrals from a select few local prosthetic and physical therapy clinics which might have led to selection bias in our study. There is the possibility that only participants with certain personality, physical capacity, and socioeconomic characteristics might have participated in our study. For example, only those with a lower fear of falling may have felt confident performing the mobility tests required in this study. Furthermore, while we were able to determine whether or not participants currently have difficulty making ends meet at the end of the month, we were unable to determine whether or not participants were above or below the poverty line at the time of amputation, which may have been a contributing factor in whether or not they received physical therapy.

CONCLUSION

We found that older adults with lower limb loss demonstrate a higher fear of falling and reduced mobility than those without limb loss in the same cohort. This is in agreement with the latest available evidence. However, there is no significant difference in functional outcome measures between those who received physical therapy and those who did not. This is also the case for socioeconomic difficulty, for there was no significant difference between those with socioeconomic difficulty compared to those without difficulty. Although there is no statistical significance, it is evident that there are trends in the TUG, 6MWT, and FFABQ that can be informative. With that in mind, participants who did not receive physical therapy had decreased mobility, increased fear of falling, and overall less satisfaction with their prosthesis. The same trend is apparent in socioeconomic difficulty, for those who had socioeconomic difficulty had decreased mobility, increased fear of falling, and overall less satisfaction with their prosthesis. Our study highlights the effects of physical therapy and socioeconomic status, however, without a proper sample size the link is unclear. Future studies should continue to investigate the link between socioeconomic status, and physical therapy on mobility and fear of falling. Additionally, future studies should look into whether there is a direct correlation between socioeconomic status and access of physical therapy for those with lower extremity amputation.

REFERENCES

1. Miller WC, Speechley M, Deathe B. The prevalence and risk factors of falling and fear of falling among lower extremity amputees. *Arch Phys Med Rehabil.* 2001;82(8):1031-1037.
doi:10.1053/apmr.2001.24295.
2. Miller WC, Speechley M, Deathe AB. Balance confidence among people with lower-limb amputations. *Phys Ther.* 2002;82(9):856-865.
3. Felcher SM, Stinner DJ, Krueger CA, Wilken JM, Gajewski DA, Hsu JR. Falls in a Young Active Amputee Population: A Frequent Cause of Rehospitalization? *Mil Med.* 2015;180(10):1083-1086.
doi:10.7205/MILMED- D-14-00450.
4. Gaskin, D. J., Thorpe Jr, R. J., McGinty, E. E., Bower, K., Rohde, C., Young, J. H., ... & Dubay, L. (2014). Disparities in diabetes: the nexus of race, poverty, and place. *American journal of public health, 104*(11),2147-2155.
5. Newton KM, Wagner EH, Ramsey SD, et al. The use of automated data to identify complications and comorbidities of diabetes: a validation study. *J Clin Epidemiol.* 1999;52(3):199-207.
<http://www.ncbi.nlm.nih.gov/pubmed/10210237>. Accessed September 7, 2016.
6. Johannesson A, Larsson G-U, Ramstrand N, Turkiewicz A, Wiréhn A-B, Atroshi I. Incidence of lower-limb amputation in the diabetic and nondiabetic general population: a 10-year population-based cohort study of initial unilateral and contralateral amputations and reamputations. *Diabetes Care.* 2009;32(2):275-280. doi:10.2337/dc08-1639.
7. Hoffman C, Paradise J. Health Insurance and Access to Health Care in the United States. *Annals of the New York Academy of Sciences.* 2008; 1136: 149–160.
8. Wilper A, Woolhandler S, Lasser A, et al. *Health Insurance and Mortality in US Adults.* 2009; 99(12):2289-2295.

9. Gaunaurd I, Spaulding SE, Amtmann D, et al. Use of and confidence in administering outcome measures among clinical prosthetists: Results from a national survey and mixed-methods training program. *Prosthet Orthot Int*. 2015;39(4):314-321. doi:10.1177/0309364614532865.
10. Sjö Dahl C, Jarnlo GB, Persson BM. Gait improvement in unilateral transfemoral amputees by a combined psychological and physiotherapeutic treatment. *J Rehabil Med*. 2001;33(3):114-118. <http://www.ncbi.nlm.nih.gov/pubmed/11482351>. Accessed April 18, 2016.
11. Wang R, Wu C, Zhao Y, et al. Health related quality of life measured by SF-36: a population-based study in Shanghai, China. *BMC Public Health*. 2008;8:292. doi:10.1186/1471-2458-8-292
12. Landers MR, Durand C, Powell DS, et al. Development of a scale to assess avoidance behavior due to a fear of falling: the Fear of Falling Avoidance Behavior Questionnaire. *Phys Ther*. 2011;91(8):1253-1265. doi:10.2522/ptj.20100304.
13. Legro MW, Reiber GD, Smith DG, et al. Prosthesis Evaluation Questionnaire for Persons With Lower Limb Amputations: Assessing Prosthesis-Related Quality of Life. *Archives of physical medicine and rehabilitation* 79.8 (1998): 931-938.
14. Brcic V, Eberdt C, Kaczorowski J. Development of a Tool to Identify Poverty in a Family Practice Setting: A Pilot Study. *Int J Family Med*. 2011;2011:1-7. doi:10.1155/2011/812182.
15. Lee S-P, Dufek J, Hickman R, Schuerman S. Influence of Procedural Factors on the Reliability and Performance of the Timed Up-and-go Test in Older Adults. *Int J Gerontol*. 2016;10(1):37-42. doi:10.1016/j.ijge.2015.10.003.
16. Resnik L, Borgia M. Reliability of outcome measures for people with lower-limb amputations: distinguishing true change from statistical error. *Phys Ther*. 2011;91(4):555-565. doi:10.2522/ptj.20100287.

17. Li AM, Yin J, Yu CCW, et al. The six-minute walk test in healthy children: reliability and validity. *Eur Respir J*. 2005;25(6).
18. Steffen TM, Hacker TA, Mollinger L. Age- and Gender-Related Test Performance in Community-Dwelling Elderly People: Six-Minute Walk Test, Berg Balance Scale, Timed Up & Go Test, and Gait Speeds. *Phys Ther*. 2002;82(2):128-137.
doi:10.1093/ptj/82.2.128
19. Durand C, Shalom Powell D, Shalom D. Development of a scale to assess avoidance behavior due to a fear of falling: The Fear of Falling Avoidance Behavior Questionnaire (FFABQ) Repository Citation.
<https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=2300&context=thesedissertations>. Accessed March 16, 2018.
20. Christiansen CL, Fields T, Lev G, et al. Functional Outcomes After the Prosthetic Training Phase of Rehabilitation After Dysvascular Lower Extremity Amputation. *PM&R*. 2015;7(11):1118-1126.
doi:10.1016/j.pmrj.2015.05.006.
21. Hordacre B, Reiber GD, Birks V, et al. Physiotherapy Rehabilitation for Individuals with Lower Limb Amputation: A 15-Year Clinical Series. *Physiotherapy Research International*. 2013;70-80.
22. Mansfield C, Wilson J et al. Premature Mortality in the United States: The Roles of Geographic Area, Socioeconomic Status, Household Type, and Availability of Medical Care. *American Journal of Public Health*. 1999;89(6):893-898.
23. Power C, Manor O, Mathews S. The Duration and Timing of Exposure: Effects of Socioeconomic Environment on Adult Health. *American Journal of Public Health*. 1999;89(7):1059-1065.

24. Pedersen M, Overgaard D, et al. Experience of exclusion: A framework analysis of socioeconomic factors affecting cardiac rehabilitation participation among patients with acute coronary syndrome. *European Journal of Cardiovascular Nursing*. 2017; 0(00) 1-9.
25. Leavitt RL. Developing Cultural Competence in a Multicultural World, Parts 1 & 2
Introduction to Part 1.
<https://pdfs.semanticscholar.org/49d2/05921fb0b8ad4a3b447b538a7ea3ce0c9101.pdf>.
Accessed March 16, 2018.
26. Perera, S., Mody, S. H., Woodman, R. C. and Studenski, S. A. (2006), Meaningful Change and Responsiveness in Common Physical Performance Measures in Older Adults. *Journal of the American Geriatrics Society*, 54: 743–749. doi:10.1111/j.1532-5415.2006.00701.x

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