Gender Differences in Psychosocial and Physical Outcomes in Haitian Amputees

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OBJECTIVE. The purpose of this study was to investigate the gender differences in psychosocial and physical outcomes in users of lower-extremity prostheses who became amputees after the 2010 earthquake in Haiti.

METHOD. We enrolled 140 unilateral amputees in this cross-sectional study in Port-au-Prince, Haiti. Trained staff administered the assessments by reading the questions aloud to participants. Participants completed the Trinity Amputation and Prosthesis Experience Scales and Locomotor Capabilities Index about 2 yr after the earthquake.

RESULTS. We found no gender differences in psychosocial adjustment and physical outcomes, except for strenuous physical activities and phantom pain, and both genders reported difficulty in social adjustment. After controlling for strenuous physical activities and phantom pain, we found that men showed worse psychosocial adjustment than women.

CONCLUSION. Services for psychosocial adjustment are critical for traumatic amputees and should be incorporated into rehabilitation programs after a disaster. Interventions should consider gender roles in the indigenous culture.

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A dearth of information is available regarding the prevalence of amputees in Haiti before the January 12, 2010, 7.0-magnitude earthquake. However, based on studies of developing countries that have suggested a rate of 1 to 2 amputees per 1,000 people, it is estimated that 9,700–19,400 amputees lived in Haiti before the 2010 earthquake (Bigelow et al., 2004; Staats, 1996). Prosthetic resources were limited in Haiti before the earthquake, with only three permanent and two temporary prosthetic shops serving the population (Bigelow et al., 2004).

The earthquake caused major destruction in the poorest country in the Americas (World Bank, 2017). It was estimated that 220,000 people were killed and more than 300,000 were injured. Approximately 6,000–8,000 Haitians underwent amputations as a result of injuries related to the earthquake (Campbell, Coll, & Thurston, 2012). The absence of an adequate infrastructure for the delivery of medical and rehabilitative services before the disaster, in combination with the disaster's magnitude, resulted in an influx of nongovernmental organizations (NGOs) that delivered prosthetic devices and related medical and therapeutic care after the disaster. Because no coordination existed for the delivery of these devices and related care, little is known about the psychosocial and physical outcomes of prosthesis users after the earthquake. However, Haiti's unique culture and terrain, as well as extreme poverty, would make adapting both physically and psychosocially to life after amputation challenging for these survivors.

The optimal goal of rehabilitation for limb-loss survivors is to facilitate their ability to reintegrate into their community (Singh, Hunter, Philip, & Tyson, 2008). Several factors such as prosthetic fitting, rehabilitation services, pain, and employment possibilities influence the long-term outcome after amputation (da Silva, Rizzo, Gutierrez Filho, Ramos, & Deans, 2011; Hirsh, Dillworth, Ehde, & Jensen, 2010; Rosseland & Stubhaug, 2004; Singh et al., 2008). The outcomes of limb fitting, physical activity, amputation, pain, and prosthesis satisfaction have been related to gender (da Silva et al., 2011; Gallagher, Allen, & MacLachlan, 2001; Hirsh et al., 2010; Katon & Reiber, 2013; Rosseland & Stubhaug, 2004; Singh et al., 2008). Singh and colleagues (2008) found that gender was the only significant independent factor that contributed to the success of lower limb fitting. They reported that men were more likely to experience successful limb fitting than women, controlling for age, level of amputation, comorbidity, and hospital length of stay (Singh et al., 2008). Other researchers have reported that men performed better in physical activities such as active transportation, work, and yard work and were more likely to ambulate after amputation compared with women (da Silva et al., 2011; Hirsh et al., 2010). In addition, in a study of 104 lower-extremity (LE) amputees, women were more likely to experience phantom pain than men, although the underlying causes of phantom pain are unknown (Gallagher et al., 2001).

Historically, women experience more disadvantages than men in the process of recovery from natural disasters around the world (Horton, 2012). Haitian women particularly encounter gender inequality such as systematic gender-related violence, exclusion, and cultural discrimination (Gammage, 2004). Haitian women are viewed as socially inferior and have experienced sexual double standards in the society. They were provided unequal access to resources after the 2010 earthquake, when the disaster relief agencies were primarily dominated by men (Horton, 2012). In addition, disabilities in Haitian culture have been viewed as dangerous, mysterious, and related to the supernatural (Jacobsen, 2004). Therefore, Haitian women with disabilities are in a difficult position from which to recover.

Gender and disability inequality support the need to investigate the possibility of gender differences in the physical and psychosocial outcomes in prosthesis users after the 2010 earthquake in Haiti. Previous studies have shown that physical and psychosocial challenges existed for prosthesis users in Haiti after this earthquake (Delauche et al., 2013; Randolph et al., 2014). Randolph et al. (2014) found that prosthesis users in Haiti were still

experiencing both physical and psychosocial difficulties 1–2 yr after the earthquake and had more difficulties in psychosocial adjustment than physical adjustment. Although a qualitative study revealed gender inequality and recommended that gender-specific strategies should be considered in delivering disaster relief in Haiti (Horton, 2012), the empirical evidence of gender differences in the outcomes of prosthesis users after the 2010 earthquake is still limited.

The purpose of this study was to investigate the gender differences in psychosocial and physical outcomes in LE prosthesis users who became amputees because of the 2010 earthquake in Haiti. The two research questions were (1) Do men and women differ in outcomes of psychosocial adjustment, physical capability, prosthesis satisfaction, and pain? and (2) How much did gender account for the variances of the psychosocial outcomes in LE prosthesis users after the 2010 earthquake in Haiti?

Method

Participants

We recruited 140 people who had a unilateral LE amputation as a result of injuries sustained after the 2010 earthquake. Participants were recruited by a trained field worker throughout various settings in Port-au-Prince, Haiti, including permanent and temporary residences, tents, and NGO prosthetic and orthotic clinics. Recruitment also occurred through word of mouth among amputees. Inclusion criteria were a unilateral LE amputation as a consequence of the earthquake; average use of a prosthesis for a minimum of 4 hr per day; and age ≥ 18 yr at the time of the study. Potential participants were provided a free physical examination by a physiatrist and a referral, if needed, for prosthetic repair or adjustment and rehabilitation services.

Procedure

A cross-sectional survey study was conducted between October 2011 and June 2012 in Port-au-Prince. Participants were enrolled in the study in collaboration with a nonprofit health clinic. Although this clinic specialized in infectious diseases, it became a first responder immediately after the earthquake and provided rehabilitation services until July 2012. This study was approved by the institutional review board (IRB) of Florida International University and the IRB of the nonprofit health clinic in compliance with the Haitian Health Ministry.

The written materials were translated to Creole from English by the principal investigator (PI; Randolph), who is a native Creole speaker, and the Creole materials were

back-translated to English by two physical therapy doctoral students and a nurse who are native Creole speakers and fluent in English (Bullinger et al., 1998; Mazaheri et al., 2011). Additionally, the research team, including Haitian staff members, met several times to review the accuracy and original intent of the materials. Afterward, a back translation step from English to Creole was conducted, and the back-translated version of the materials was compared with the original English version and was deemed equivalent (Randolph et al., 2014).

The informed consent form and all the questionnaires were read aloud to participants because of the high illiteracy rate in Haiti. The PI monitored and enhanced protocol fidelity by reviewing audio recordings of the questionnaire delivery for the first 50 participants and ensured that the questionnaires were administered in accordance with the training of staff.

Training of Staff

Three staff of the rehabilitation unit were trained to complete the data collection. Interrater reliability was maximized by assigning only one task to each staff member. One obtained informed consent, one administered the Trinity Amputation and Prosthesis Experience Scales (TAPES; Gallagher & MacLachlan, 2000), and one administered the Locomotor Capabilities Index (LCI; Franchignoni, Orlandini, Ferriero, & Moscato, 2004).

Instruments

Trinity Amputation and Prosthesis Experience Scales. The TAPES asks general questions about the length of time wearing a prosthesis and about pain and other medical problems (Gallagher & MacLachlan, 2000). Phantom pain and residual pain are determined by two dichotomous self-report questions. Other medical problems are assessed by participants describing in their own words the health problems that they experience besides amputation. In addition, the TAPES assesses three domains: (1) Psychosocial Adjustment, (2) Activity Restriction, and (3) Satisfaction.

The Psychosocial Adjustment domain is composed of three subdomains (General Adjustment, Social Adjustment, and Adjustment to Limitation) and has a total of 15 items. The items capture psychosocial adjustment for people wearing an artificial limb (e.g., “I do not mind people asking about my artificial limb”). The domain rates degree of agreement for each item using a 5-point scale. A rating of 5 indicates that the participant is well adjusted. The Activity Restriction domain contains 12 questions and uses a 3-point scale, ranging from 0 (*not*

limited at all) to 2 (*limited a lot*), to assess participants’ degree of limitation. We reversed the scores for data analysis purposes so the results were consistent with the other domains, in which higher scores represent a better outcome. The Satisfaction domain assesses two aspects of satisfaction: satisfaction of prosthesis function (e.g., comfort, fit) and satisfaction of prosthesis aesthetics (e.g., color, shape). Higher scores indicate higher satisfaction.

Locomotor Capabilities Index. The LCI is a self-report instrument to assess participants’ physical ambulatory skills (Franchignoni et al., 2004). One subscale (Basic) has seven tasks assessing basic activities, such as “Get up from a chair,” and the other (Advanced) has seven tasks assessing advanced activities, such as “Go down a few steps without a handrail.” The 4-point rating scale ranges from 0 (*cannot do*) to 3 (*can do it independently*). Higher scores represent better ambulatory skills.

Data Analysis

We conducted descriptive statistics, *t* tests, a χ^2 test, and multiple regression analyses using IBM SPSS Statistics (Version 18; IBM Corp., Armonk, NY). Descriptive statistics were used to generate demographic information. *t* tests were conducted to investigate the gender differences on the TAPES and the LCI. The χ^2 test was used to examine the significant gender differences in phantom and residual pain. The multiple regression models with stepwise regression procedures were used to investigate how much gender accounted for the psychosocial outcome.

Results

The study included 68 men (48.6%) and 72 women (51.4%) who met the inclusion criteria, ranging in age from 17 to 64 yr, for a total of 140 participants. The mean (*M*) age of the participants was 34.85 yr, and approximately 50% were transtibial amputees. The age and types of amputation did not differ significantly between men and women, $\chi^2(1) = 0.15$, $p = .54$. At the time of the study, the participants had been amputees for nearly 2 yr, $M = 23.23$ mo, standard deviation (*SD*) = 2.42, and the average waiting time for a prosthetic fitting was close to 9 mo, $M = 8.94$ mo, $SD = 5.83$. The time spent waiting for prosthetic limbs was not different between men and women ($p = .60$). Table 1 presents participants’ demographic information.

Research Question 1. Research Question 1 was, Do men and women differ in outcomes of psychosocial adjustment, physical capability, prosthesis satisfaction, and pain? For psychosocial adjustment outcomes, men and women both reported lower scores on the TAPES Social Adjustment subdomain compared with their scores on the

Table 1. Study Demographics (*N* = 140)

Characteristic	Men (<i>n</i> = 68)		Women (<i>n</i> = 72)		Total	
Age, yr, <i>M</i> (<i>SD</i>)	37.30 (11.88)		32.67 (11.70)		34.85 (11.97)	
Amputation type, <i>n</i> (%)						
Transtibial	29	(42.6)	40	(55.6)	69	(49.3)
Transfemoral	37	(54.4)	31	(43.1)	68	(48.6)
Knee disarticulation	1	(1.5)	1	(1.4)	2	(1.4)
Missing data	1	(1.5)	0	(0)	1	(0.7)

Note. *M* = mean; *SD* = standard deviation.

General Adjustment and Adjustment to Limitation subdomains. However, no gender differences were found in these three subdomains, p s = .106–.735 (Table 2). Physical capability was assessed using the TAPES Activity Restriction domain and the Basic and Advanced LCI domains. Men showed significantly better physical capacity (less activity restriction) than women in both the TAPES Activity Restriction domain and the LCI Advanced subscale, $p < .001$, but no gender difference was found in the LCI Basic subscale, $p = .058$ (Table 2). In terms of prosthesis satisfaction, no gender differences were found in both aesthetic and functional prosthesis satisfaction, $p = .158$ and $.642$, respectively. Table 2 presents the details of group comparisons between men and women. Among the study's participants, 47.9% reported experiencing phantom pain and 57.1% reported experiencing residual pain. The prevalence of phantom pain was significantly higher in women than men, $p = .038$, but the prevalence of residual pain did not differ by gender (Table 3).

Research Question 2. Research Question 2 was, How much did gender account for the variances of the psychosocial outcomes in LE prosthesis users after the earthquake? We included five predictors (age, gender, phantom pain, residual pain, and advanced physical abilities [measured by the LCI Advanced subscale]) in a multiple regression analysis. These predictors were chosen on the basis of the literature; however, age and residual pain did not significantly account for the variances in psychosocial

adjustment and were excluded from the regression model during the stepwise procedures. The final three-predictor model (gender, phantom pain, and advanced physical abilities) significantly accounted for 18.0% of the variance in psychosocial adjustment (Table 4). Gender accounted for 7.0% of the total variance of psychosocial adjustment, and women scored 0.27 points higher in psychosocial adjustment than men when their LCI Advanced subscale and phantom pain scores were held constant.

Discussion

This study investigated the gender differences in psychosocial adjustment, physical capacity, prosthesis satisfaction, and pain in a sample of LE prosthesis users whose injuries were caused by the 2010 earthquake in Haiti. The findings indicated that women experienced more difficulty in strenuous physical activities and were more likely to experience phantom pain. Neither men nor women adjusted well psychosocially, especially in terms of social adjustment. According to our regression analyses, if women and men had the same level of locomotion capacity and phantom pain, women would show better psychosocial adjustment than men.

Physical Outcomes

Men and women were both competent in basic physical activities, as evidenced by the nearly perfect scores in the LCI Basic subscale. For strenuous physical activities, women had more difficulties than men, as evidenced by their significantly lower scores in the LCI Advanced subscale and in the TAPES Activity Restriction domain. Items such as “Walk outside on uneven ground” and “Running for a bus” in the LCI Advanced subscale and the Activity Restriction domain of the TAPES are most related to the daily challenges of the living environment in Haiti. Campbell and colleagues (2012) found that prosthesis users in Haiti expressed concerns about the

Table 2. Comparison of TAPES and LCI Scores, by Gender

Instrument	Domain or Subscale (Point Range)	Subdomain	Score, <i>M</i> (<i>SD</i>)		<i>t</i> (138)	<i>p</i>
			Men	Women		
TAPES	Psychosocial Adjustment (1–5)	General Adjustment	3.67 (0.58)	3.63 (0.59)	0.34	.735
		Social Adjustment	2.54 (0.50)	2.62 (0.47)	−0.98	.329
		Adjustment to Limitation	3.56 (0.87)	3.79 (0.76)	−1.63	.106
	Satisfaction (0–4)	Aesthetic	3.26 (0.77)	3.08 (0.72)	1.42	.158
		Functional	3.67 (0.55)	3.63 (0.58)	0.47	.642
	Activity Restriction (0–2)	—	1.17 (0.34)	0.84 (0.31)	5.92	<.001
LCI	Basic (0–21)	—	19.60 (2.00)	18.67 (3.12)	1.91	.058
	Advanced (0–21)	—	17.34 (3.40)	13.88 (4.60)	4.85	<.001

Note. LCI = Locomotor Capabilities Index; *M* = mean; *SD* = standard deviation; TAPES = Trinity Amputation and Prosthesis Experience Scales; — = not applicable.

Table 3. Participants With Phantom and Residual Limb Pain

Pain Type	Men	Women	Total	$\chi^2(1)$	<i>p</i>
Phantom	26	41	67	4.31	.038*
Residual	34	46	80	2.83	.093

**p* < .05.

physical barriers in their daily life even after participating in a prosthetics rehabilitation program. The authors' semistructured interviews revealed that prosthesis users worried about walking on steep hills and rugged terrain where they lived with their family or crossing canals with a lot of gravel in the city. Our findings indicated that the physical environment in Haiti created tremendous barriers to prosthesis users, especially for women.

Less successful limb fitting among women might be related to their difficulties in strenuous physical activities. Researchers showed that women in the United Kingdom had worse limb fitting than men at discharge (Singh et al., 2008). In our recruitment site, we also found that women were provided used prostheses or less advanced prostheses that did not appear to be a good fit for their residual limbs, whereas most men were provided with new prostheses specifically fitted for their residual limb. This observation is consistent with Horton's (2012) finding on gender inequality in accessing resources after the earthquake.

Psychosocial Adjustment

We found that 1–2 yr after amputation, male and female prosthesis users in Haiti had accepted their artificial limbs (general adjustment) and believed that they could still do similar tasks (adjustment to limitation) to those they had done before amputation. However, they did not adjust well to their social environment regarding how others saw their artificial limbs. This difficulty mirrors that of trainees attending a prosthetic rehabilitation program in Haiti who expressed their concerns and fear of being isolated and alone after returning to their community (Campbell et al., 2012). In Haiti, the stigma of all disabilities, not only amputation, often results in social exclusion (Campbell et al., 2012).

People without limb loss can view amputees as disabled and make negative judgments. In addition, to avoid

their own anxiety and discomfort, people without disability are likely to ignore those with disabilities (Horgan & MacLachlan, 2004). This behavior can create social isolation and discomfort in people with disabilities, which are linked to depression (Horgan & MacLachlan, 2004; Rybarczyk, Nyenhuis, Nicholas, Cash, & Kaiser, 1995; Rybarczyk et al., 1992). Poor psychosocial adjustment is not a short-term issue among amputees (Atherton & Robertson, 2006; Gallagher & MacLachlan, 2000; Hill, Niven, & Knussen, 1995; Horgan & MacLachlan, 2004). For example, after an average of 9.7 yr after amputation, a sample of amputees still reported psychological distress (Hill et al., 1995). Moreover, accessibility of sustainable mental health services and psychosocial interventions after a disaster is critical for better long-term outcomes (Fullerton, Reissman, Gray, Flynn, & Ursano, 2010; Raviola, Eustache, Oswald, & Belkin, 2012) for people without disabilities, let alone for those with the added challenge of amputation.

Three factors—gender, phantom pain, and advanced physical abilities—were significantly associated with psychosocial outcomes in a multiple regression model. Gender significantly accounted for 7% of the variance of psychosocial adjustment (*p* = .003). Moreover, after controlling for physical capacity and pain, women adjusted better psychosocially than men. This finding challenges other gender studies of amputees, most of which found better outcomes for men (Gallagher et al., 2001; Rybarczyk et al., 1992; Singh et al., 2008; Xu & Wu, 2011). For example, a study completed 1 yr after an 8.0-magnitude earthquake in Wenchuan, China, found that men had better psychological recovery than women (Xu & Wu, 2011).

Despite sampling differences, how individuals respond to the hazards of a disaster is strongly affected by their distinctive cultural, social, and economic environments (Gaillard et al., 2008). The unique nature of these factors in Haiti may explain our finding that, when men and women had the same level of pain and physical capacity, women adjusted better than men psychosocially after amputation. Gender inequality is embedded in Haitian culture (Rendón & Nicolas, 2012). This inequality is most evident in occupation roles, education, and finances. For example, girls are more likely to be withdrawn from their education than boys because of insufficient financial resources and the need for help with household chores. As a result, women have a higher illiteracy rate than men (World Bank, 2006), and poor education limits women's opportunities for formal work that could generate more income (Padgett & Warnecke, 2011).

Traditionally, the occupation roles of Haitian men have been in formal physically demanding labor such as

Table 4. Multiple Regression Analysis of Factors Influencing Psychosocial Adjustment

Predictor ^a	Standardized Coefficient	<i>p</i>
Gender	0.29	.003
Phantom pain	−0.26	.004
Advanced physical abilities (LCI)	0.32	<.001

Note. All coefficients are significant at *p* < .05. LCI = Locomotor Capabilities Index.

^aVariance explained = 18.0% (*R*²).

heavy agricultural or construction jobs, and they do little to no household duties (Padgett & Warnecke, 2011). The occupation roles of Haitian women have been caregiving, household chores, and informal low-wage jobs such as market vendors (Padgett & Warnecke, 2011; Rendón & Nicolas, 2012). Given these occupation roles, Haitian women experience extreme poverty. In addition, although Haitian women have been recognized as “pillars of society” because of their numerous responsibilities, they also have been silenced in this patriarchal society (Bell, 2001; Rendón & Nicolas, 2012). Some women might be the sole breadwinners in their male-dominated household but are still expected to be subservient to their husbands, particularly in poor households (Rendón & Nicolas, 2012).

This context, where Haitian women are especially oppressed by extreme poverty and authority, potentially develops their resiliency (Rendón & Nicolas, 2012). In contrast, Haitian society expects men to be authority figures and to exhibit an image of strength. Therefore, Haitian men may be more fearful of relinquishing their authority or showing signs of weakness as a result of a disability. Moreover, because of the high unemployment rate in Haiti’s depressed economy, it is difficult for many men to find work. It is even more difficult for men with a disability to fulfill their occupation roles when their jobs require heavy physical demands. Therefore, because of the expectations of gender roles in Haitian culture and the resiliency of Haitian women, the impact of amputation on psychosocial adjustment is greater for Haitian men than Haitian women when controlling for physical outcomes.

Pain

The high percentage of residual pain in our participants (57.1%) compared with participants 1 yr after amputation in another studies (10%–13%) might be because of poor limb fitting and the lack of prosthetic repair services in Haiti (Jensen, Krebs, Nielsen, & Rasmussen, 1985; Parkes, 1973). The lack of sustainable prosthetic services in Haiti is a significant problem for prosthesis users after the initial fitting. To reduce the prevalence of residual pain, prosthetic adjustments, repairs, and accessories should be available in the follow-up care.

Study Limitations

This study has several limitations. First, because we recruited participants in Port-au-Prince, our sample represents only amputees living in an urban environment. Amputees living in rural regions might experience dif-

ferent social, cultural, and environmental challenges. As a result, our findings might not be generalizable to amputees who live in rural regions of Haiti. Second, we measured participants’ functional activity level with the TAPES and the LCI, but we did not measure how well they performed their roles in their everyday environment (as measured by the participation component in the *International Classification of Functioning, Disability and Health* [World Health Organization, 2001]). Men and women play different roles and perform tasks that require different physical capabilities; for example, many men are required to do heavy agricultural work, and many women are expected to fetch water (Padgett & Warnecke, 2011). Without assessing gender-specific occupational function, we were unable to determine whether participants were able to successfully return to their roles in the community. Future studies may use assessments that assess gender-specific occupational function to reflect real-world obstacles men and women may encounter in fulfilling their roles in the community. Finally, we did not include people with bilateral LE amputations, nontraumatic amputees, or those who wore their prosthesis less than 4 hr per day. Therefore, the research findings cannot be generalized to all LE amputees in Haiti.

Implications for Occupational Therapy Practice

The results of this study have the following implications for occupational therapy practice:

- Given the poor psychosocial adjustment of the participants, it is critical to provide psychosocial interventions to amputees in the rehabilitation process after a disaster.
- Psychosocial interventions, including residual limb care, pain management, mood management, coping skills training, and cognitive restructuring, can facilitate recovery (Ehde et al., 2013; Wegener, Mackenzie, Ephraim, Ehde, & Williams, 2009). For Haitian women, practitioners should highlight the importance of pain management and residual limb care and fitting. For Haitian men, practitioners should emphasize coping and cognitive restructuring skills to build self-efficacy.
- Gender, phantom pain, and advanced physical abilities are important predictors for psychosocial adjustment.
- Occupation and gender roles, indigenous culture, and contextual environment need to be considered when evaluating the needs of and providing interventions to amputees.

Conclusion

Postdisaster relief efforts, including rehabilitation services for limb loss, should consider gender differences in the indigenous culture and the need for mental health services. Sustainable prosthetic services, education of the general public regarding disabilities, and psychosocial interventions should be part of a comprehensive rehabilitation process in long-term recovery after a disaster. ▲

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