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Psychosocial Factors Influence Physical Activity after Dysvascular Amputation: A Convergent Mixed-Methods Study

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Abstract

Background: Physical function is a common target of rehabilitation intervention to improve disability and physical activity after dysvascular lower-limb amputation (LLA); yet, the influence of psychosocial factors on physical activity is unclear.

Objective: To identify psychosocial factors with potential to influence clinically relevant measures of physical activity, physical function, and disability in light of participants' narratives.

Design: Convergent mixed-methods.

Setting: General community.

Participants: Twenty participants with dysvascular LLA were enrolled if their most recent LLA was at least 1 year prior, they were ambulating independently with a prosthesis, and were between 45 and 88 years old.

Intervention: Not applicable.

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Main Outcome Measures: Quantitative data included physical activity (activPAL; steps/d), physical function (Timed Up-and-Go; TUG), and disability (World Health Organization Disability Assessment Schedule 2.0; WHODAS 2.0). Qualitative data were collected via semistructured interviews.

Results: Higher steps/d was moderately correlated with better TUG time ($r = -.58$, $P < .01$), but was not correlated with WHODAS 2.0 score ($r = -0.18$; $P > .10$). Qualitative analysis of interviews, using an inductive, team-based, phenomenological approach, identified four themes: (1) perceptions of their prosthesis, (2) fear during mobility, (3) influence of LLA on life activities, and (4) positive outlook within social interactions. Mixed-methods analysis used an iterative approach to interpret and describe how psychosocial factors influence physical activity in four exemplar cases.

Conclusions: Physical activity in people with dysvascular LLA results from an interaction among perceptions of their prosthesis, fear during mobility, influence of LLA on life activities, and positive outlook within social interactions. The overlapping nature of these themes suggests that interventions targeting psychosocial factors may be associated with improved physical activity, physical function, and subsequent disability after dysvascular LLA.

Introduction

Dysvascular lower-limb amputation (LLA) most commonly results from longstanding diabetes mellitus (DM) complicated by dense sensory and motor neuropathy leading to a nonhealing wound and subsequent tissue loss or severe peripheral artery disease (PAD) with critical limb ischemia.[1] The number of people in the United States with amputation related to complications of DM and PAD is anticipated to be 1.3 million by 2020 because of an aging population with a rising incidence and prevalence of DM and PAD.[2] Importantly, poor physical function, low physical activity, and severe disability are common among people with dysvascular LLA.[3–6]

Following LLA of any etiology, the International Classification of Functioning, Disability, and Health (ICF; Figure 1A) is used to guide the development of individually tailored treatment plans that address patient-centered goals (ICF).[7,8] On average, poor physical function at the time of rehabilitation discharge after dysvascular LLA, when measured with the Timed Up-and-Go (TUG) and gait speed, may be indicative of high risk for multiple falls, morbidity, and mortality.[3,9–12] Further, people with dysvascular LLA take an average of 1700–3800 steps/d, falling well below the recommended minimum 5000 steps/d for people with disability.[4,5,13] The poor physical function and low physical activity after dysvascular LLA are common and do not improve over time without targeted intervention.[3,4]

Personal factors (eg, self-efficacy) and environmental factors (eg, social support) influence rehabilitation outcomes for people with and LLA.[14–19] For example, higher self-efficacy, social support, and acceptance are facilitators of physical activity in veterans with LLA.[16] Additionally, self-efficacy partially mediates the relationship between perceived physical function and disability following LLA, where greater self-efficacy is associated with lower disability.[17] Rehabilitation clinicians could incorporate frameworks that emphasize the role of psychosocial factors (eg, self-efficacy, social support) on health, physical activity, and disability outcomes after dysvascular LLA. Social Cognitive Theory (SCT; Figure 1B) is one such framework that has been used to understand psychosocial mechanisms of health behaviors related to aging and chronic disease.[20,21] Behavior-based interventions, founded in SCT, have used group-based approaches targeting improved self-monitoring, knowledge, and problem-solving skills to increase self-efficacy and physical activity in populations with DM and PAD *without LLA*.[15,22,23] The interaction of physical and behavioral factors could both be important in low physical activity and severe disability, suggesting that interventions founded in both the ICF and SCT may be complementary to physically directed interventions when reframing rehabilitation after dysvascular LLA. However, the complex interaction between physical and psychosocial constructs is unclear in this population.

Use of mixed-methods studies within rehabilitation research can enhance our understanding how psychosocial factors influence physical activity.[24–26] Importantly, a critical component of mixed-methods is the interpretation of relationships between quantitative and qualitative findings,[24,25] extending our understanding beyond prior research using one approach in isolation.[16–19] Therefore, the purpose of this mixed-methods study was to identify psychosocial factors with potential to influence clinically relevant measures of physical activity, physical function, and disability in light of participants' narratives.

Methods

Mixed-Methods Study Design

This convergent mixed-methods study[25] was part of a larger quantitative study investigating the relationship of psychosocial factors (eg, self-efficacy, social support, motivation) with disability following LLA near middle age or older. Qualitative and quantitative data were collected concurrently and findings interpreted with the intent of corroborating, validating, and describing relationships among the data.[25] Data collection and analysis procedures were developed using recommended guidelines for mixed-methods research.[24,25] Quantitative measures of physical activity, physical function, and disability were selected based on evidence of psychosocial relationships among these variables and clinical relevance to rehabilitation clinicians. A phenomenological qualitative approach was used to describe the meaning, common features, and essence of lived experiences through participant perceptions and narratives.[27]

Sample Recruitment and Enrollment

Recruitment for the larger quantitative study was conducted through local hospitals with longstanding amputation rehabilitation specialty clinics. Participants were included if they had an LLA (above ankle) due to complications of DM and/or PAD at least 1 year prior to enrollment, they were ambulating independently with a prosthesis (with or without assistive device), between 45 and 88 years old, and within driving distance of the Denver metro area. Participants were excluded if they had a cancer-related amputation, had a stroke within the prior 2 years, or were not independently using a prosthesis for ambulation. A subset of participants were selected for this mixed-methods study using a purposive sampling strategy to ensure a variety of participant perspectives were represented within the study sample.[28]

Participants were selected based on level of LLA, physical activity, physical function, and disability. Informed consent was obtained from all participants before data collection procedures. The study protocol was approved by the Colorado Multiple Institutional Review Board and Veterans Affairs Office of Research and Development.

Data Collection

Physical activity, operationalized as steps/d, was measured in participants' free-living environment for 10 days using thigh-mounted triaxial accelerometry (activPAL3; PAL Technologies, Glasgow, UK). Accelerometry is a valid and reliable measure of physical activity for older adults, people with LLA, and populations with slow or asymmetric gait.[29–31] Accelerometry data were collected at 20 Hz, downloaded, and analyzed using proprietary software to extract the number of steps/d (PALanalysis; PAL Technologies, Glasgow, UK).[32] Average steps/d were used for analysis when participants had at least 4 valid days of accelerometer wear time.

The TUG, an assessment of balance, short distance gait, and transitional movements, was used to measure physical function.[33,34] Participants were instructed to rise from an 18-inch-high chair, walk 10 ft, turn around, and return to sitting in the chair as quickly and safely as possible.[33,34] Although the TUG was originally tested using a comfortable pace,[33] instructions for "as quickly and safely as possible" were used to allow for comparison to community-dwelling older adults and other studies of people with LLA.[34,35] The TUG performed in this manner has high reliability (intraclass correlation coefficient = 0.98) and established cut-points to indicate fall risk for community-dwelling older adults.[34] A stopwatch was used to measure the amount of time to complete the task, and an average of two trials was used for analysis.

Self-reported disability was measured using the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0). The WHODAS 2.0 is an internationally developed questionnaire to assess the severity of disability due to any health condition.[17,36,37] Participants indicate the amount of difficulty when completing 12 common tasks over the past 30 days (1: no difficulty to 5: extreme difficulty). A sum score was used for analysis, where higher WHODAS 2.0 scores indicate greater severity of disability.[36]

A researcher trained in qualitative methods, who was also a licensed physical therapist (M.J.M.), conducted all semistructured interviews and collected field notes of nuances for data collection while in participants' homes or locations of their choosing. A semistructured interview guide (Table 1) was iteratively developed by the interdisciplinary research team based on prior experience and research evidence of psychosocial factors that influence physical activity after dysvascular LLA.[18] The guide and probing questions were used to elicit participants' detailed descriptions about life experiences following dysvascular LLA. Interviews were audio recorded, transcribed verbatim, and used to interpret how psychosocial factors influence physical activity. Debriefing meetings with the interviewer and team members were conducted following every two to three interviews to identify areas that would benefit from additional probing, describe emergent concepts, and discuss progress toward thematic saturation. Semistructured interviews and quantitative data collection were conducted until thematic saturation, the point where no additional data collection would add to the analysis, was obtained.[38]

Analyses

Quantitative and Qualitative Analyses—Mean and interquartile range of quantitative data were calculated to describe the study sample. Additionally, linear correlation of steps/d with TUG and WHODAS was tested (Pearson r; $P < .05$). Qualitative data were analyzed using the six-step method proposed by Creswell.[28] Two researchers (M.J.M. & K.P.) independently described personal experiences in writing to bracket or set aside biases (Step 1) and embarked on an inductive coding process (Step 2). The researchers independently reviewed three transcripts and developed lists of nonrepetitive, nonoverlapping codes. The researchers met, discussed their respective lists of codes and definitions, and developed a consolidated codebook. The researchers then independently applied the codebook to the remaining transcripts, reconciling their transcripts, adding, modifying, condensing, or splitting codes as needed. This process continued until no new codes were added, at which point the final codebook was be applied to the remainder of the transcripts. Qualitative data were managed using Atlas.ti software (v 8.0). Coding disagreements were arbitrated by a third researcher (M.A.M.). Next, the coded data were grouped into categories and themes (Step 3). Independent descriptions of *what* (Step4) and *how* (Step 5) participants experience physical activity were written, including verbatim quotes as examples. Finally, a written synthesis was developed of *what* and *how* physical activity is experienced from the perspective of people with dysvascular LLA (Step 6).

Mixed-Methods Analyses—Mixed-methods analysis began by integrating individual participants' quantitative measures and exemplar quotes within a joint display, sorted and ranked in descending order of physical activity. A joint display is a recommended tool for mixed-methods to facilitate interpretation and understanding of relationships among data.[39] Next, quantitative data within the joint display were searched for emergent patterns of steps/d, given correlations among variables and individual measures of physical function and disability. Finally, an iterative process was undertaken to interpret and describe psychosocial mechanisms of physical activity from emergent qualitative themes and exemplar quotations in light of quantitative findings.

Interpretive rigor (eg, trustworthiness, credibility) of this mixed-methods study was enhanced using triangulation, an audit trail, debriefing meetings, and consultation with a patient engagement group.[40] Triangulation of findings occurred through the interpretation of multiple data sources measuring (quantitative) and describing (qualitative) interrelated constructs by an interdisciplinary team to comprehensively understand a phenomenon.[26,40,41] An audit trail was maintained to enhance credibility of study findings and was consulted during throughout debriefing meetings.[40] Debriefing ensured that emergent constructs were present within the data, where research team members took a naïve stance to ask questions of the interviewer.[40] Finally, members of an amputation support group provided input on near complete qualitative and mixed-methods interpretations to increase credibility of emergent themes. Adult participants (N = 12) in the support group had any level of LLA and were at any stage of post-LLA rehabilitation (eg, acute, prosthetic training, long term).

Results

Twenty-two potential participants were selected for this study. One participant was unable to be contacted for scheduling and another participant refused because of time constraints. Therefore, data were collected from 20 people with dysvascular LLA.

Quantitative and Qualitative Results

Descriptive characteristics of the participants (male: 90%, unilateral transtibial LLA: 75%) are presented in Table 2. Higher steps/d was correlated with better TUG time (r = −0.58; *P* = .007) but not WHODAS 2.0 score (r = −0.18; *P* = .44). Participants generally reported exercising “the way I want to exercise,” where physical activity levels ranged from “not active” to “relatively active” and were rarely discussed in the context of progressive resistance or aerobic exercise. Qualitative analysis of semistructured interviews uncovered that physical activity was the result of four interdependent and overlapping themes: perceptions of their prosthesis, fear during mobility, influence of LLA on life activities, and positive outlook within social interactions. A visual representation of the interdependence and overlapping nature of themes is depicted in Figure 2.

Perceptions of their Prosthesis—Participants’ descriptions of physical activity were commonly influenced by perceptions of security and trust with their prosthesis during mobility. For example, participants described a sense of security with their prosthesis suspension system and indicated that trust of componentry was empowering, enhancing their perceptions of mobility and participation in life activities. When describing the importance of socket suspension, one participant stated, “You want to make sure it’s secure. That you can walk and not think about it wanting to fall off or something” (55-year-old man, unilateral transtibial amputation). Participants also reported greater trust in higher technology componentry (eg, dynamic response foot, microprocessor knee), which they stated allowed more natural movement with decreased effort or pain.

Fear during Mobility—Participants commonly reported fear of falling during mobility while wearing their prosthesis. Fear of falling was described within specific mobility-related tasks (eg, stair mobility) or locations (eg, work). One participant reported, “That’s where I get really scared. Falling in an unfamiliar place, falling in my house or in my yard, is scary anyway, but it’s not nearly as bad as being out” (71-year-old man, bilateral, mixed-level amputation). Fear of falling was accompanied by descriptions of avoidance of vigorous or challenging activities that were previously enjoyed. In reference to fear of falling, a participant stated, “I really can’t go hiking, and I know a lot of my friends love to go hiking and stuff. They love adventure. There’s some things I’ll choose not to do” (55-year-old man, unilateral transtibial amputation). Participants who experienced a greater number of falls also reported greater fear of falling, avoidance of activities, and less confidence in their prosthesis.

Influence of LLA on Life Activities—All participants' narratives described the influence of LLA on nearly all life activities. The influence of LLA was broadly described within two subthemes: effort and time for everyday activities and difficulty achieving life goals.

Effort and time for everyday activities.: Participants consistently described a need for increased effort and time to do self-care tasks, housework, hobbies, and social activities after dysvascular LLA. Greater physical effort was needed to complete transitions and mobility, whereas greater time was needed to identify adaptations that would minimize physical effort and to complete life activities. For example, one participant described a lengthy process of fixing a sink during which he minimized effort by staying on the floor, while his spouse gathered tools and supplies upon request.

Additionally, participants described some physically focused activities that were no longer possible after LLA because the effort, adaptation, and/or time were too great. For example, some participants reported that they no longer mow their lawn because the effort, adaptation, and time to push the lawn mower, maintain balance, and manage the associated tasks were too great following LLA. Finally, for some participants, greater severity of LLA (eg, bilateral, above knee), acute/chronic medical issues, and secondary conditions (eg, obesity, osteoarthritis) limited the number of possible adaptations, while exacerbating the effort and time to needed complete activities.

Difficulty achieving life goals.: All participants described difficulty in progressing toward life goals while concurrently adapting to changes in other areas of their life. Examples of life goals included losing weight, increasing physical activity, and improving mobility while wearing their prosthesis. One participant stated, "There is no bigger goal this year than to lose weight, and I'm sure that will help balance" (66-year-old man, unilateral transtibial amputation). Although participants stated positive life goals for the future, prioritization of more immediate needs commonly left participants feeling disengaged from these life goals. For example, participants described prioritizing adaptations to more immediate needs that included changes in their residual limb health, comorbid health conditions, health complications, or social networks. Finally, a few participants felt that they did not receive adequate education that was tailored to their specialized needs after LLA (eg, importance of exercise, alternative modes of exercise, weight loss strategies). For these participants, the lack of education limited their understanding and experiences of how to initiate, increase, or maintain progress toward their life goals.

Positive Outlook within Social Interactions—A positive outlook, in combination with feeling support in social interactions, was critical to life after amputation. Building and maintaining a positive outlook included participation in personally meaningful activities, acceptance of modification, and expecting challenge during life activities. Positive outlook, a synergistic relationship between motivations, positive emotions, and confidence, was facilitated by social networks, especially those that included people with similar health and life challenges. Further, motivations for activities included a drive to be as normal as possible, return to prior activities, feel success in challenging situations, and engage in social activities and family roles. One participant reported, "You find a way to do what you want to do. If it's that important, you will find a way. It may take a long time, it may take other help, whatever you gotta do, but you'll find a way" (61-year-old man, unilateral transtibial amputation). Supportive social networks were also a resource for overcoming emotional challenge and developing potential strategies for adapting life activities, facilitating the initiation and continuation of recovery after amputation. Another participant reported his brother was, "Just moral support, I guess. Sometimes I would get in to a situation where I was wantin' to do somethin' and being that I live alone, I'd have to have an extra pair of hands. He'd help me with that, whatever I was doing" (69-year-old man, unilateral transtibial amputation). Finally, some participants described building a positive outlook by supporting others, whether through running errands, volunteering at church, or spending time with new amputees.

Developing a positive outlook was difficult, with nearly all participants describing detrimental effects of poor self-image, unmet expectations, social isolation, low confidence, or negative perceptions related to social interactions. One participant stated, "Then [the amputation] happened and it sucked to see my friends go on to be able to do those things and I couldn't. They'd say [to me], 'You wanna be on a volleyball team at the Rec Center? Oh yeah, we forgot.' Or, 'You wanna go on that hike? Oh yeah, we forgot.'" (60-year-old woman, unilateral transtibial amputation). The combination of these factors resulted in frustration, low motivation, depressed emotions, and feeling different or less than others. Others described feeling socially isolated because of their rural location, transportation difficulties, or mobility limitations. Participants with negative perceptions of social interactions commonly exhibited avoidance behavior. For example, some participants avoided swimming in public because they were fearful of rejection from others. Some participants expressed reluctance in consulting social networks due to conflicting perceptions about confidence, safety risk, ability, and strategy to complete tasks.

Mixed-Methods Results

Participants' steps/d and TUG rankings were generally consistent with correlated data (eg, higher steps/d with better TUG), whereas steps/d and WHODAS 2.0 score did not demonstrate a consistent pattern (noncorrelated data). Interpretation of emergent themes within participants ranked by steps/d revealed that *"perceptions of their prosthesis," "fear during mobility,"* and *"positive outlook within social interactions"* tended to affect participants' *"influence of LLA on life activities."* Four exemplar cases from the joint display integration of steps/d are presented in Table 3. Joint display findings suggest that participants with better TUG and positive outlook are likely to have higher steps/d (Participant B). Alternatively, participants with worse TUG despite attempts to develop positive outlook may not be capable of higher physical activity (Participant E). Participants in the midrange of steps/d had TUG in the midrange and narratives that tended to link *"positive outlook within social interactions"* with steps/d and WHODAS (Participants C and D). Finally, Participant A was a deviant case example, where steps/d was unexpectedly high in the presence of depressed mood, social isolation, negative outlook, and poor self-image. Further analysis and interpretation of Participant A's narrative identified strong motivations to use physical activity to address fears of future medical complications, a motivation that was not identified within qualitative analysis alone.

Discussion

The purpose of this convergent mixed-methods study was to identify psychosocial factors with potential to influence clinically relevant measures of physical activity, physical function, and disability in light of participants' narratives. Qualitative analysis in this study identified that physical activity after dysvascular LLA is the result of four overlapping themes: (1) perceptions of their prosthesis, (2) fear during mobility, (3) influence of LLA on life activities, and (4) positive outlook within social interactions. Furthermore, qualitative findings facilitated the mixed-methods description of how psychosocial factors positively or negatively influence physical activity after LLA with respect to quantitative measures of physical function and disability.

Study findings are largely consistent with the life participation focus of the ICF, where health condition, body function and structure, and activities are emphasized. Daily step count and physical function, as measured by the TUG, were moderately correlated ($r = -.58$, $P < .05$), and there was a pattern of greater steps/d in the setting of better TUG time, especially in participants with the highest and lowest steps/d. For example, Participant B took 4500 steps/d on average and had a TUG time of 10 seconds, placing their rank within the sample at 85% and 70% respectively. Conversely, Participant E took <1000 steps/d and had a TUG time of 22 seconds, placing their rank within the sample at 15% and 25% respectively. These findings reinforce previous recommendations that physical function is a necessary target of interventions to improve physical activity after dysvascular LLA.

The SCT focus on psychosocial mechanisms of physical activity extend our understanding from the perspective of people with dysvascular LLA. Although there was no correlation between steps/d and WHODAS 2.0 ($r = -0.18$; $P > .05$), participants' narratives facilitated the interpretation of how psychosocial factors influence physical activity, especially for participants with physical activity in the sample midrange (Participants C and D). For example, although Participant C had physical activity that was near the sample average steps/d, this individual also had below-average TUG time and WHODAS 2.0 score in the lowest 10% of the sample. This constellation of scores was explained by Participant C's waning optimism and motivation to continue to participate in activities in the presence of current physical function limitations, fear of falling, and difficulty adapting to progressive declines in health and function after LLA. In contrast, Participant D had below-average steps/d, while TUG time and WHODAS 2.0 score were well above the sample average. Although Participant D's TUG time indicated capacity for greater physical activity, his below-average steps/d were accompanied by motivations for relatively sedentary activities he enjoyed, and low motivation for additional physical activity because of perceptions of needing to restrict activity and/or limit participation after LLA. These examples of participants' psychosocial factors suggest that these should be targeted with interventions to improve physical activity and disability after dysvascular LLA.

Behavioral interventions, founded in SCT and other behavior change theories, are a recommended approach for health promotion and disease prevention. Although behavioral interventions targeting psychosocial factors can improve physical activity and other rehabilitation outcomes for people with LLA,[35,42] psychosocial mechanisms of physical activity were largely unknown prior to this study. Emergent qualitative themes in the setting of severely low physical activity (mean: 2968 steps/d) suggest that behavioral interventions to address psychosocial factors after dysvascular LLA are critical. Further, the findings of this study are meant to advance our understanding of behavioral intervention design for people with dysvascular LLA. Self-efficacy, social support, and other psychosocial factors have been previously targeted with behavioral interventions for populations with chronic disease[14,15,43] and may improve rehabilitation outcomes if targeted after dysvascular LLA. For example, the chronic disease self-management program, which uses tailored feedback, action planning, and problem solving in a group-based setting, effectively improves self-efficacy, depression, and social activity limitation in a variety of patient populations (eg, arthritis, DM, heart disease).[14] Additional study is needed to more fully understand the relationships and mechanisms among physical activity, physical function, and disability following dysvascular LLA.

Limitations

Although the sample size was sufficient to achieve thematic saturation of qualitative analysis, the number of participants was small, and predominantly comprised of non-Hispanic white men with unilateral transtibial amputation. This small sample size and use of one measure to represent each construct (eg, TUG for physical function) limits the potential generalizability of quantitative findings. Additionally, the exploratory nature of this study uncovered and described overlapping themes that were not specifically measured and therefore could not be quantitatively analyzed. Future studies should comprise larger sample sizes, with a larger proportion of women and racial minorities to quantitatively examine the influence of specific psychosocial factors on physical activity and disability after dysvascular LLA of varying level of amputation.

Conclusion

Physical activity, physical function, and subsequent disability in people with dysvascular LLA results from an interaction among perceptions of their prosthesis, fear during mobility, influence of LLA on life activities, and positive outlook within social interactions. The overlapping nature of these themes suggests that behavioral interventions targeting these psychosocial factors may lead to improve rehabilitation outcomes after dysvascular LLA.

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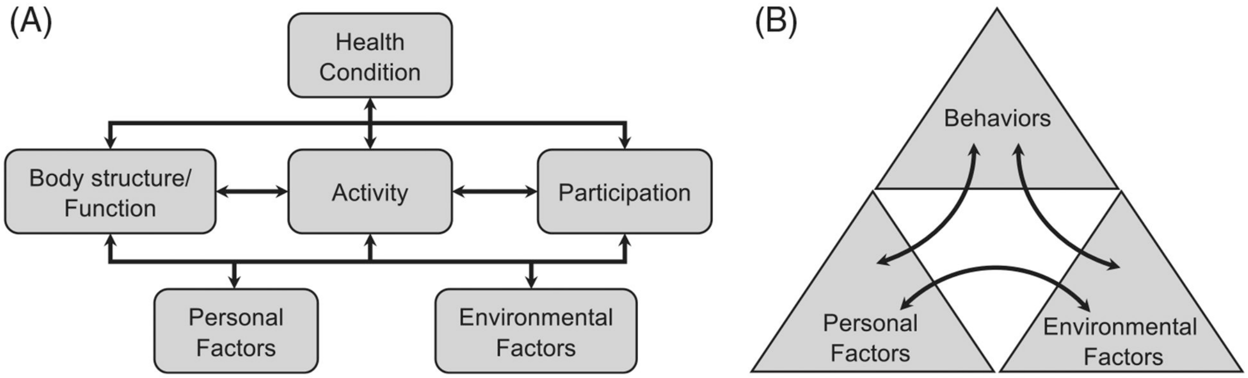

Figure 1.
Conceptual models of the International Classification of Functioning (A) and Social Cognitive Theory (B).

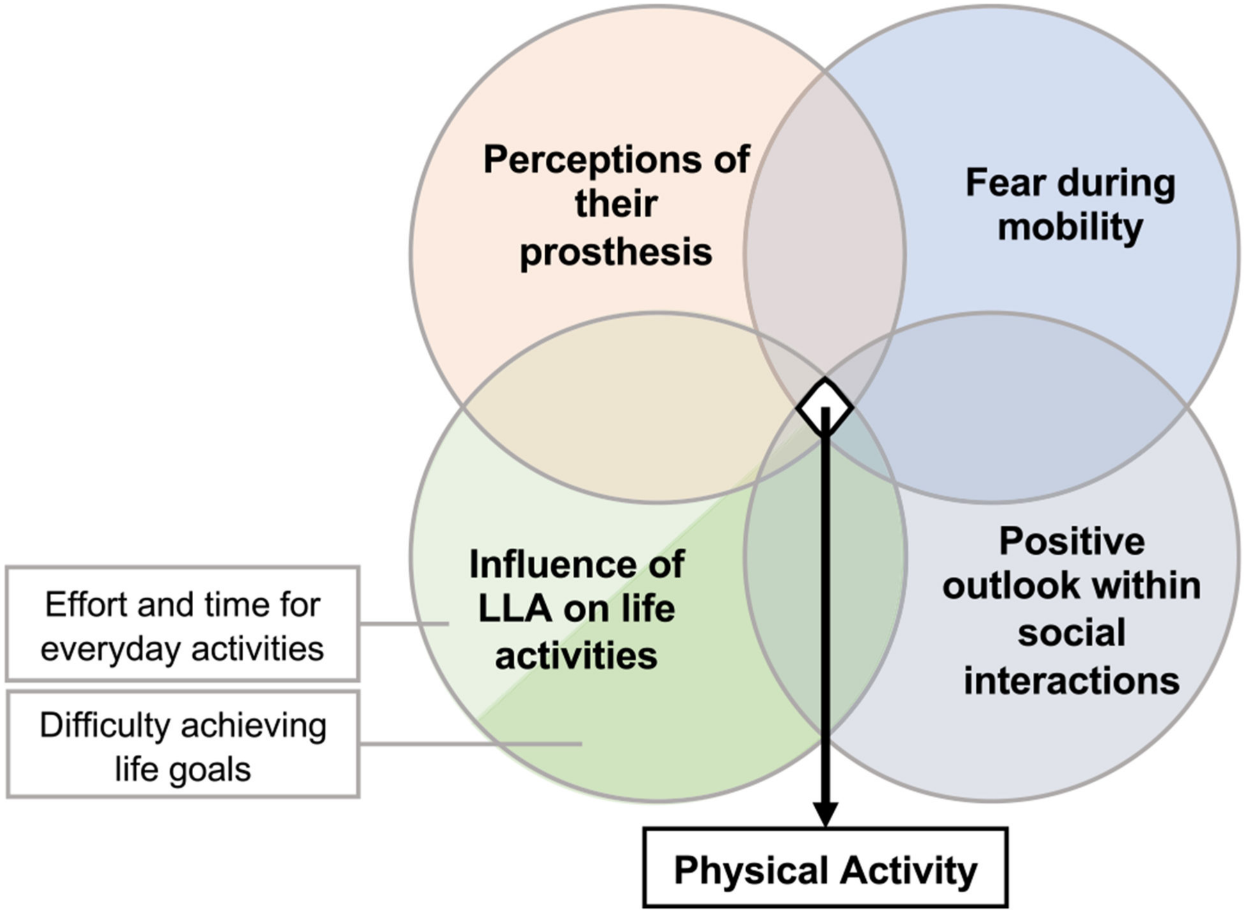

Figure 2.
Visual representation of emergent qualitative themes resulting in physical activity after dysvascular lower-limb amputation (LLA).

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Table 1

Semistructured interview guide

Primary questions:	**Example probe:**
Describe how your health, including your amputation, affect your day-to-day life.	What is different in your life after the amputation?
Describe your rehabilitation after the amputation?	What helped you the most?
How would you describe your physical exercise?	What do you do for exercise?
Tell me about your prosthesis.	How do you use your prosthesis?
Can you describe how your amputation came about?	What was your recovery process like?

Table 2

Descriptive statistics (N = 20)

Participant characteristics	
Age (y)	63.4 (57.5, 70.0)
Caucasian (%)	18 (90%)
Time since amputation (years)	5.5 (2.4, 6.7)
Male (%)	18 (90%)
Amputation level	
Unilateral transtibial amputation	15 (75%)
Unilateral above knee amputation	2 (10%)
Bilateral lower limb amputation	3 (15%)
Daily step count	2968 (1570, 4195)
Timed Up-and-Go (s)	17.8 (9.8, 21.8)
WHODAS 2.0	22 (17, 29)

Mean (interquartile range) or n (%); WHODAS 2.0 = World Health Organization Disability Assessment Schedule 2.0.

Table 3

Joint display of exemplar participants' quantitative measures, quotations, and mixed-methods interpretations

Participants	Quantitative data (% rank)	Exemplar quotations	Mixed-methods interpretations
Participant A 62 y/o male 7 years post unilateral TTA	**Steps/d:** 6529 (95%) **TUG (s):** 11.8 (60%) **WHODAS 2.0:** 30 (25%)	• "I've never been confident, but [amputation] exacerbates it because my world is narrower, of what I can do." • "You know, one of the things that they said is, 'you don't walk, you can get a blood clot.' So, that's one of the reasons I walk, I want to optimize my health." • "When I lost the leg, I was 230 lbs. So, I've gained weight. I'm trying to get down, but with depression you have depression eating, and depression eating means weight gain."	This participant is a deviant case of high physical activity with high steps/d, depressed mood, low confidence, avoidance of social interaction, and severe disability (WHODAS). High steps/d can be explained by adequate physical function (TUG) and strong motivation to prevent health complications and lose weight.
Participant B 66 y/o male 3 years post unilateral TTA	**Steps/d:** 4556 (85%) **TUG (s):** 10.3 (70%) **WHODAS 2.0:** 18 (60%)	• "I have a good mental attitude. I have what a lot of people spend their entire life trying to get. I have a nice home, great wife, two great sons, great daughter." • " I'd like to be able to go up and down stairs without hanging on to the hand rail, but I can't because I'm feeling like I'm going to tip all the time."	This participant had steps/d above the sample average with positive outlook, confidence, and social support. Participant described barriers to physical activity (eg, risk of fall, skin breakdown) that may contribute to disability.
Participant C 65 y/o male 10 years post unilateral TTA	**Steps/day:** 3497 (60%) **TUG (s):** 17.3 (35%) **WHODAS 2.0:** 33 (10%)	• "The thought of falling again has become really serious. I mean, the right kind of fall, I could die from it." • "We've got sidewalks all over the place over here. It's a wonderful place, but walking up and down and cracks and things like that send me standing rigid 'cause I'm afraid I'm gonna fall." • "You know I hadn't let go of that motivation to just be as normal as I can. I—that's slipping away."	This participant had average daily steps count and described a recent fall in the setting of steadily declining physical function with a negative impact on motivation, confidence, and positive outlook. These waning factors may contribute to this participant's reports of disability and steps/d.
Participant D 54 y/o male 3 years post unilateral TTA	**Steps/d:** 2284 (45%) **TUG (s):** 10.3 (75%) **WHODAS 2.0:** 16 (80%)	• "[Challenge] is good for the soul and mind." • "Get out and about. Do some walkin'. Go to the grocery store. I go help my buddies with their Harleys and 90% of the game is keeping a good attitude. And that requires getting out."	This participant had step counts near the sample average with a positive outlook and high confidence. Steps/d can be explained by sedentary activities, low motivation for new activities, or limited knowledge of current activity levels.
Participant E 52 y/o male 5 years post unilateral TFA	**Steps/d:** 817 (15%) **TUG (s):** 22.4 (25%) **WHODAS 2.0:** 21 (45%)	• "That's been probably my most difficult task of trying to walk. Walk more normal and trusting that [prosthetic knee] to do what I think it's supposed to do. " • "In the [amputated side] hip and what parts of that leg that are left, they're not strong enough. I don't have quite enough strength just to do [a curb] without support from the hands."	This participant has low steps/d with limited trust in prosthetic components, confidence, and strength after TFA. These factors, in addition to physical function (TUG), potentially explain steps/d and disability for this participant.

TUG = Timed Up-and-Go; WHODAS 2.0 = World Health Organization Disability Schedule 2.0; TTA = transtibial amputation; TFA = transfemoral amputation.