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Recreational activities of lower-limb amputees with prostheses

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Abstract—Ninety-two (92) persons with lower-limb amputations who regularly used prostheses responded to a survey that included questions about preferred recreational activities. This article describes the variety of activities selected by these men and women aged 20 to 87 years. Of the activities that were of high importance, 74% to 88% could be performed. Those activities assigned moderate to low importance were less often reported as able to be performed. The activities that require high energy level were more problematic for performance. The diversity of identified activities (n=166) underscores the value of learning about amputees' activity preferences when making prosthetic prescription decisions.

Key words: *lower-limb amputee, lower-limb prosthesis, physical function, recreational activities.*

INTRODUCTION

The goal of rehabilitation for persons with lower-limb amputations is to foster a rapid return to activities of daily living by achieving the best prosthetic function possible. Physical function with a prosthesis includes the ability to walk, perform daily activities, and engage in recreational activities. An effective prosthesis makes a positive contribution to the amputee's ability to accomplish these activities.

Recreational activities provide entertainment and socialization as well as maintain physical health and well-being through participation in sports and exercise. Physical activity has been named as a leading health indicator by the Centers for Disease Control in *Healthy People 2010* (1). This same publication indicates that people with disabilities are less physically active than people without disabilities. It is important for health maintenance that rehabilitation and prosthetic care take into account the physical activity interests and preferences of patients in order for those with disabilities to achieve the highest possible activity levels.

The purpose of this article is to describe the self-reported recreational activities important to persons living with a lower-limb prosthesis.

METHODS

Sample

A sample of 114 persons was identified from two hospitals, the VA hospital and the county trauma center,

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in Seattle, Washington. Eligibility criteria included being at least 18 years old, having had a lower-limb amputation (Symes level, transtibial, through the knee, or transfemoral) one year or more ago, and using a lower-limb prosthesis at least five days a week. The study received approval from the University of Washington (2–4).

Measures

Subjects were invited to complete a lengthy questionnaire by mail about life using a lower-limb prosthesis. Responses were used to develop a questionnaire to evaluate prosthetic status and quality of life (2). The original questionnaire consisted of eleven sections including one on the ability to perform specific activities. Participants were asked to complete a series of questions titled "Regarding Recreational Activity," which included naming two favorite recreational activities (see Appendix A for text from the questionnaire). They also indicated how important it was to them to be able to do each named activity and judged how able they were able to perform the activity under two circumstances, both with and without their prosthesis.

Analysis

A linear analog scale format was employed and data entry using a light pen was involved to provide scores from 0 to 100. Importance responses were scored as 0="not at all" to 100="extremely important," and Ability responses were possible from 0="cannot" to 100="no problem."

Besides examining means and standard deviations of the interval data, we chose to collapse some responses into categories. "Importance" was recorded as 0–33=low importance, 34–66=moderate importance, and 67–100=high importance. From the "Ability" responses, a score of "Able to perform with the prosthesis" or "Able to perform without the prosthesis" was assigned to an activity that was scored between 51 and 100 (anywhere between midpoint and "no problem"). Furthermore, a score was constructed for "Able to perform the activity" if a person scored at least 51 *either* with *or* without their prosthesis. We chose not to use statistical tests of differences because there were no specific hypotheses.

Results

The 92 persons who returned a questionnaire were predominantly male (85.9 percent) with an average age of 55 years (mean 54.95 years, SD 13.7 years; range 20 to 87 years). Sixty-three percent had undergone transtibial (below the knee) amputations an average of 18 years ago (mean 17.97 years, SD 17.18 years; range 1 to 53 years). SF-36 health status scores for the group were compared with age-comparable US population norms. Respondents were found to score significantly lower on each of the SF-36 subscales with the exception of mental health ($p<0.01$: social function; $p<0.001$: physical function, physical role, bodily pain, general health, vitality, and emotional role).

Eighty-seven percent of the respondents who returned a survey named two activities as requested. Six and one-half percent named only one activity, and 6.5 percent did not name any activity. In all, 166 activities were listed. Missing data occurred with low frequency among the "Importance" and "Ability" questions as well. For example, of the 86 first-named activities, 94.5 percent had complete information about importance and ability to do the activity with and without the prosthesis, and 87 percent of the additional questions about the second-named activities were complete. No one named the same activity twice.

The list of amputees' recreational activities was remarkably broad. The 10 most commonly named activities included bowling, camping, dancing, fishing, gardening, golf, hunting, reading, walking, and woodworking. (See Appendix B for an alphabetical list of all named activities presented in respondents' words and followed by the number of times it was mentioned.) In order to consolidate these responses so that comparisons could be made, similar activities were grouped. For example, cycling was grouped with bicycling. Sports that were mentioned only once were grouped under "sports," while those named by several persons retained the name of the sport.

Two authors (ML, JC) then developed a coding system to categorize each activity by two attributes that are of particular interest to persons with lower-limb amputations. "Energy Level" is a general estimate of how much energy is usually required to perform a named activity (high, moderate, low, or sedentary). The second descriptive category, "Lower-Limb Impact Load," was constructed to indicate the impact load an activity would have on the residual limb (high to moderate, low to none). Every activity was assigned a level and load score. The grouping and coding were first scored separately, and then the investigators compared their results and resolved differences by consensus. **Table 1** includes the results of this work.

Because some activities appeared to be traditionally gender-specific, the responses were separated by gender

to examine this assumption. **Table 2** contains the consolidated activities listed by energy level and by gender. The differences between gender groups appear in the high, moderate, and low energy level categories.

Assumptions are often made about the type of activity amputees of different ages will choose for recreation, thus the data was stratified by age. **Table 3** suggests that the two younger groups in this study are similar in their

Table 1.
Preferred recreational activities by energy level and impact load.*

	Lower-limb impact load	
Energy required for activity	**High to moderate**	**Low to none**
High energy	**active sports** (backpacking, basketball, climbing, football, hiking, hunting, racquetball, roller skating, skiing, water skiing) **hunting**	**active sports** (weight lifting, seated skiing) **wheelchair basketball**
Moderate energy	**dancing** **moderate sports** (golf, walking) **mowing the lawn**	**camping cooking** **wheelchair dancing** **hobbies** (woodworking, work on cars) **moderate sports** (bicycling, bowling, exercise, kayaking, swimming)
Low energy		**hobbies** (fishing, gardening, pool) **low activity sports** (boating, canoeing, mild exercise, motorcycling, sailing) **travel** (driving, flying a plane) **sex**
Sedentary		**crafts** (crocheting, custom glass) **hobbies** (bingo, collectibles, computer, TV, electronics, model making, music, painting, photography, wood carving) **socializing** (bingo, cards, visiting with family and friends) **reading**

*Unclassified: Work, travel (Reno, RV-ing)

Table 2.
Preferred recreational activities by gender and energy level.

Energy required for activity	Activities	Male (n=141)	Female (n=25)
High	Basketball, hunting, other high energy sports	13.5%	4%
Moderate	Bicycling, boating, bowling, camping, dancing, shopping, swimming, other moderate energy sports	29.1%	52%
Low	Cooking, fishing, gardening, motorcycling, photography, playing pool, wood crafts, other low energy activities	29.8%	12%
Sedentary	Reading, socializing, steam bathing, other hobbies and crafts	20.6%	24%
Unclassified: (too vague)	Travel, work	5%	8%

Table 3.
First-named activity: Distribution across energy level by age group.

Age group	High energy level (%)	Moderate energy level (%)	Low energy level (%)	Sedentary (%)
20–39 yrs old (n=11)	27.3	**45.5**	27.3	0
40–59 yrs old (n=44)	20.5	**48.7**	25.6	5.1
60–83 yrs old (n=37)	5.9	32.4	**41.2**	20.6

distribution of activities across energy levels. However in the 60–85-year-old group, the persons were more likely to choose moderate and sedentary activities.

The mean "Importance" scores for the first- and second-named activities were examined. **Table 4** shows the mean importance assigned by respondents to both their first- and second-named activities to be similar and high (scores: 87 and 85, respectively). However, there were wide variations in scores, as seen in the standard deviations.

Table 4 also contains mean scores indicating the respondents' judgment of their ability to perform each of the activities they named, both with and without their prosthesis. As expected, the ability to perform an activity, on average, was much higher using a prosthesis than not using it. For the first-named activity, the mean score for ability to perform the activity with their prosthesis was 66.5 (on a scale from 0 to 100). However, their activity score without their prosthesis was 30.0 on the same scale. A similar pattern was seen for the second-named activity. The mean score for ability with a prosthesis was 74.6, while without a prosthesis, the mean ability score dropped to 33.9. However, standard deviations were large, indicating a wide variation in judged ability to perform under either condition.

In an attempt to explore this wide variation in ability scores, we looked at respondents who reported that they could do the named activity under *at least one* condition, i.e., with *and/or* without their prosthesis. An examination of individual cases also provided some insight into the wide variations in scores, i.e., large standard deviations around mean scores. For example, some persons named activities that they were able to perform equally well with or without their prosthesis (cooking, crocheting, fishing, model railroading, music, painting, photography, RV-ing, reading, and socializing). Others named activities that they could perform markedly better without their prostheses (wheelchair basketball, some hobbies, mild exercise, sex, swimming). In other words, individuals who named an activity did not necessarily rely on their prosthesis in the same manner to perform that activity. Most notably, of those who liked to fish, 8 needed to use their prosthesis to be able to fish, 5 others could fish equally well with and without their prosthesis, and yet others said they could not fish with or without their prosthesis.

Table 4.
First and second preferred activity mean scores* for importance of activity and ability to perform activity under two conditions.

	How important is being able to do this activity? Mean (SD)	How well I can do this activity when *using my prosthesis?* Mean (SD)	How well I can do this activity *without my prosthesis?* Mean (SD)
First activity (n=86)	86.9 (17.3)	66.5 (35.4)	30.0 (41.1)
Second Activity (n=80)	85.3 (20.0)	74.6 (31.2)	33.9 (40.4)

*All scores are from 0=low to 100=high, or a better score.

Table 5 is presented to allow an overall review of the evaluations provided by the respondents about their first- and second-choice recreational activities. The table lists the first and second activities separately to avoid bias, since the same individuals are evaluating more than one activity. The data in this table suggest that persons with prostheses were likely to be able to perform the activities they identified as being of *high* importance. Of the first-named activities that were identified as being of high importance, 74 percent could be performed. Similarly, of the second-named activity, 88 percent of high-importance activities could be performed. Also of interest in this table is the observation that the activities that require high energy levels are most problematic for performance.

DISCUSSION

This exploratory report is presented to increase awareness of prosthetic and rehabilitation providers regarding the range and variation by age and gender of recreational interests for lower-limb amputees. The data are drawn from a cross-sectional survey of 92 lower-limb amputees living in the Northwest. Our methods of data consolidation were appropriate for the data, but are not sophisticated. We have not drawn any comparisons with similar work about the activities of nonamputees. The strength of this sample is the number of years that respondents have been living with their prostheses (mean, 18 years). It is heartening to find them involved with so many recreational activities.

There is extensive research that supports the importance of exercise in the prevention of heart disease and the prevention of osteoporosis, as well as many other positive health attributes, in the nonamputee population. It is reasonable to assume that this also applies to the amputee. The CDC's *Healthy People 2010* (1) contains the statement that persons with disabilities are less likely to get the suggested amount of physical exercise for good health. This is supported by a recent epidemiological report suggesting that male traumatic lower-limb amputees are at a higher risk of death from cardiovascular disease than are nonamputees in their cohort (5). For amputees, then, it is important to encourage physical activity. In the present report, we see amputees who are interested in many of the activities that contribute to a healthy lifestyle. However, the higher-energy activities were not as likely to be performed well. Good, available prosthetic care, as found in the VA, could support such behaviors.

These data provide some preliminary understanding of the role of recreational activities in the long-term functioning of amputees. Further research is necessary to

Table 5.
Ability to perform a preferred activity (with or without a prosthesis) by importance and required energy level.

	High energy	Moderate energy	Low energy	Sedentary	Able to perform
First-named activity (n=86)					
High importance	9	34	25	6	55 **74.3%**
Moderate importance	4	3	2	2	8 **72.7%**
Low importance	0	0	0	1	0 0
Able to perform	8 **61.5%**	25 **67.6%**	23 **85.2%**	7 **77.8%**	63
Second-named activity (n=80)					
High importance	5	18	12	14	43 **87.8%**
Moderate importance	1	3	2	1	4 **57.1%**
Low importance	0	1	0	1	0 0
Able to perform	3 **50%**	19 **86.4%**	17 **82.5%**	8 **50%**	47

understand the extent to which limitations in prosthetic function limit the ability of the amputee to participate in recreational activities, and to understand the importance of participation in recreational activities to overall physical health as well as sense of well being.

This study demonstrates the wide variety of recreational activities preferred by amputees who have and use lower-limb prostheses. Their choices were shown to vary across energy levels and impact loads and by gender and age groups. This wide variety of activities suggests to prosthetic and rehabilitation medicine health-care providers that it is wise to discuss patients' preferred recreational activities in order to facilitate optimal prosthetic adaptation.

APPENDIX A

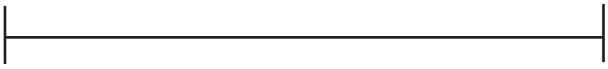
Text from Questionnaire

REGARDING RECREATIONAL ACTIVITY

N. Name two of your favorite recreational activities (sports, hobbies, crafts, or some other activity.)

#1_____ **#2**_____

How important to you is being able to do Activity #1?

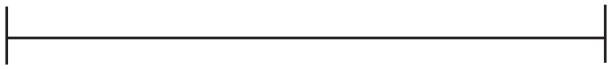


NOT AT ALL **EXTREMELY IMPORTANT**

Over the PAST FOUR WEEKS, rate how you have felt about being able to take part in Activity #1 *when using your prosthesis.*

CANNOT **NO PROBLEM**

Over the PAST FOUR WEEKS, rate how you have felt about being able to take part in Activity #1 *when not using your prosthesis.*



CANNOT **NO PROBLEM**

(Repeated for Activity #2)

APPENDIX B

Backpacking (1), baseball collectibles (1), basketball (3), bicycling (3), biking (1), billiards (1), bingo (1), boating (2), bowling (5), camping (5), canoeing (1), car repair (1), cards (2), climbing (1), computer (1), cooking (5), crafts (1), crocheting (1), custom glass (1), cycling (1), dancing (6), driving (1), edit TV programs (1), electronics (1), exercise (1), family events (1), fishing (15), flying a plane (1), football (1), gardening (7), golf (5), hiking (1), hobbies (1), home crafts (1), hunting (6), kayaking (1), lawn mowing (1), mechanical work (1), mild exercise (1), model making (1), model railroading (1), motorcycling (4), music (1), outdoors (1), painting (1), photography (4), playing (1), playing pool (2), playing with my kids (1), racquetball (1), reading (5), Reno (1), roller-skating (1), RV-ing (2), sailing (2), sex (1), shooting (1), shopping (1), sightseeing (2), skiing (2), snow mobiling (1), social (1), social groups (1), sports (1), sports cards (1), steam bathing (1), swimming (6), tole painting (1), travel (2), visit with friends (1), walking (8), watching ball games (1), water skiing (1), weight lifting (1), wood carving (1), wood crafts (1), woodworking (5), work (2), working on cars (1), and working out (1).

REFERENCES

1. Centers for Disease Control. Healthy People 2010: leading health indicators. DHHS.(<http://www.health.gov/healthypeople/LHI/>).
2. Legro MW, Reiber GD, Smith DG, del Aguila M, Larsen J, Boone D. Development of the Prosthesis Evaluation Questionnaire (PEQ): lower-limb amputees evaluate their prosthesis and their prosthesis-related quality of life. Arch Phys Med Rehabil 1998;79:931–8.
3. Smith DG, Ehde D, Legro MW, Reiber GE, del Aguila M, Boone DA. Phantom limb, residual limb, and back pain after lower extremity amputations. Clin Orthop 1999;361:29–38.
4. Legro MW, Reiber G, del Aguila M, Ajax MJ, Boone DA, Larsen JA, et al. Issues of importance reported by persons with lower extremity amputations and prostheses. J Rehabil Res Dev 1999;36:155–63.
5. Modan M, Peles E, Halkin H, Nitzan H, Azaria M, Gitel S, et al. Increased cardiovascular disease mortality rates in traumatic lower limb amputees. Am J Cardiol 1998;82:1242–7.