

Identifying Meaningful Patient Outcomes After Lower Extremity Injury, Part 1: Patient Experiences During Recovery

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Context: Determining meaningful aspects of health is crucial for outcome assessment; however, limited literature exists on the aspects of health that are deemed meaningful by the athletic patient population.

Objective: To identify experiences and meaningful outcomes after lower extremity (LE) musculoskeletal injury among collegiate athletes.

Design: Qualitative study.

Setting: University laboratory

Patients or Other Participants: A purposive sample of 20 athletes (10 men, 10 women; age = 20.1 ± 1.83 years) from a National Collegiate Athletic Association Division I institution in the Midwest who had sustained an LE injury.

Data Collection and Analysis: Semistructured face-to-face interviews and inductive data analysis were conducted. Trustworthiness of the data was established using member checks and peer debriefing.

Results: Four themes emerged from the data, revealing that physical changes, psychological changes, personal and lifestyle changes, and support were the most meaningful outcomes among athletes with an LE injury. The 4 themes were associated with 21 subthemes, indicating the complexity with which LE injury affects individuals

Conclusions: Our findings demonstrate the importance of caring for the whole person. Athletic trainers must broaden their focus to provide the best patient care and consider the person's activities and life demands outside of athletic participation. The themes identified in this study provide a basis for selecting appropriate health markers and outcome measures.

Key Words: evidence-based practice, health-related quality of life, patient-centered care, qualitative research, patient values

Key Points

- After lower extremity injury, collegiate athletes acknowledged physical, psychological, and personal and lifestyle changes in addition to support as essential meaningful outcomes.
- The participants' responses emphasized the importance of recognizing patient values in the framework of evidence-based practice.
- These themes offer a foundation for identifying markers of health and appropriate outcome measures for athletic patients.

Integrating the concept of evidence-based decision making into standard athletic training practice is an evolving process. Sackett et al¹ described the 3 guiding elements of evidence-based practice as (1) research evidence, (2) clinician experience, and (3) patient values. Although these elements can apply to every clinical aspect of health care, it is during treatment and recovery that identifying and appreciating patient values become paramount. These values, also referred to as *patient-oriented or meaningful patient outcomes*, are a vital component of evidence-based practice.^{2,3} Patient-oriented outcomes allow patients to have a voice in their care by providing clinicians with an accurate and thorough list of the outcomes from which to gauge the efficacy of the care provided by the clinician.⁴ As such, accurately identifying patient values, or the outcomes that are meaningful to the patient, is crucial to providing patient-centered care.

Given that athletic patients are often still participating in an organized athletic activity while they receive care,^{5,6} identifying meaningful outcomes to this unique patient population would seem an important step in advancing athletic training practice. Although various patient-reported outcome instruments exist, their direct application to athletic patients is questionable. For example, although the Disabilities of the Arm, Shoulder and Hand measure displayed evidence of validity in a general patient population,⁷ subsequent researchers identified⁸ a ceiling effect when it was administered to collegiate athletes. Similar concerns have been raised regarding commonly used instruments such as the Foot and Ankle Ability Measure (FAAM),^{9,10} the Knee Injury and Osteoarthritis Outcome Scale,¹¹ and the 36-Item Short-Form Health Survey.¹² Even as a computer-adapted instrument, the Patient-Reported Outcomes Measurement Information System may not distinguish healthy recreational athletes from

National Collegiate Athletic Association Division I athletes.¹³ Whereas these instruments can be useful in the early stages of recovery, as a patient gains function, they cease to measure improvements in health status and thereby prevent athletic trainers (ATs) from accurately assessing the effectiveness of interventions and the functional abilities of their patients. This concern can hold true even for instruments that adapt to the patient's responses. The disadvantages of these instruments may lie in their failure to reflect the outcomes that patients with high levels of physical ability find meaningful when returning to their previous level of function.

An important consideration for identifying the outcomes that are meaningful to patients is directly involving them in the process.^{14,15} Morris et al¹⁶ stated, "to be meaningful, outcomes measured should be valued by patients and providers, [should] be consistent with what health professionals seek to achieve, and be robust in terms of measurement properties."

As athletic participation represents the high end of function on the ability spectrum for many athletic patients, those who are currently pursuing or have recently experienced a return to athletic activity after injury should be involved in identifying meaningful changes as their health evolves. Precedent¹⁷⁻¹⁹ exists for both the justification and the process for incorporating patient perspective when determining meaningful outcomes among various patient populations.

Although previous researchers²⁰⁻²² examined athletes' perspectives on meaningful outcomes, limited information is available regarding the end stages of recovery and rehabilitation. Granito²⁰ sought to portray the athletic injury experience by interviewing 7 injured collegiate athletes and 8 athletic training students. The results revealed 7 categories: personal factors, effects on relationships, sociological aspects, physical factors, daily hassles, feelings associated with injury, and rehabilitation. Although details about the athletes' recovery progress were not reported, the injured athletes did not appear to be in the later phases of recovery. Also, the opinions of the athletic training students differed from the experiences reported by the injured athletes. In a similar study by Grindstaff et al,²¹ who explored the meaning of sport injury, interviews with 5 injured collegiate athletes revealed 3 themes similar to those reported by Granito²⁰: emotion, coping, and relationships. They also detected 1 additional theme that encompassed perspective. Even though athletes were interviewed 3 times over a period of at least 30 days, the interview questions did not address recovery. Furthermore, the results did not indicate that the athletes were nearing their return to sport participation.

In the most comprehensive report on meaningful outcomes reported by active individuals, Vela and Denegar²² described the disablement process by interviewing 31 participants who were experiencing a musculoskeletal injury. Their participants were involved in both competitive and recreational activities, and the injuries included upper extremity and lower extremity (LE) musculoskeletal injuries. To allow ample time for the patients to have experienced a broader spectrum of disablement, the interviews were not conducted until at least 2 weeks postinjury. Using a mixed-methods design that included open- and closed-ended questions, they identified emerging

themes, which were then used to develop a generic outcome instrument for assessing disablement in physically active patients.²³ Whereas the research of Vela and Denegar^{22,23} represented an important step in assessing athletic training outcomes, additional detail is needed regarding athletic patients, who represent higher levels of functional ability, as they progress through recovery and near a return to their preinjury status. Because the majority of athletic patients receiving care have returned to sport participation, and previous investigators have not identified the meaningful outcomes reflective of this culminating stage, a measurement gap persists. To begin filling this gap, our purpose was to identify health outcomes that were meaningful to athletic patients after LE musculoskeletal injury.

METHODS

We used qualitative methods, incorporating semistructured individual interviews and a general inductive approach to identify meaningful outcomes. Qualitative designs are advantageous when researchers are trying to derive and interpret meaning from individuals' experiences.²⁴ The general inductive approach allows for the unrestricted identification of central meaning from qualitative data.²⁵

Participants

Participants were National Collegiate Athletic Association Division I athletes who had sustained at least 1 LE musculoskeletal injury in the past calendar year. For this study, an injury must have met the following criteria: (1) required medical attention by a certified AT or physician and (2) prevented or would have prevented the participant from competing in his or her chosen sport. The purpose of these criteria was to ensure that the injury had an effect on the participant's life that could be discussed. Participants also had to have recovered or be in the last phase of recovery from an LE injury. After identifying these criteria, we used purposive sampling²⁶ to recruit a sample that equally represented sexes and injury severities. This type of sampling was merited because it provided the best approach to the research question by targeting information-rich cases.²⁶ We sought equal numbers of male and female participants with moderate and severe injuries. Recovery status was based on the current athletic participation status of each individual. To be included in this study, all participants must have been cleared for either limited or full sport activity. More specifically, the participants were allowed to engage in some type of team-related activity that was sport specific but they need not have fully returned. This allowed participants to discuss their limitations and disabilities in greater detail as they transitioned through each phase of recovery. The severity of the injury had to have prevented participation in competitions, practices, and conditioning for the person's current sport for at least 24 hours as determined by self-reported time lost from athletic participation. Self-reported time lost was obtained before the interview and measured in days, weeks, or months. *Severe injury* was classified as any injury that resulted in a loss of more than 3 weeks of sports participation.^{27,28} *Moderate injury* was defined as any injury that resulted in participation restriction of more than 1 day and less than 3 weeks.^{27,28} Recruitment of participants stopped when data

Table 1. Participant Demographics

Characteristic	Sex		Group			
	Male	Female	Surgery?		Injury Severity	
			Yes	No	Moderate	Severe
Sport						
Basketball	2	1	2	1	1	2
Football	4	0	2	2	1	3
Soccer	0	1	1	0	0	1
Softball	0	1	0	1	1	0
Track and field	3	5	1	7	4	4
Volleyball	0	2	0	2	2	0
Wrestling	1	0	0	1	1	0
Body part injured						
Ankle, foot, lower leg	4	5	1	8	6	3
Hip/thigh/upper leg	4	2	0	4	2	2
Knee	2	3	5	2	2	5
Diagnosis						
Cartilage injury	2	0	1	1	0	2
Fracture	1	1	1	1	0	2
Ligament sprain	5	2	1	6	6	1
Ligament sprain and cartilage injury	0	3	3	0	0	3
Structural muscle injury	1	2	0	3	2	1
Tendinopathy	0	2	0	2	1	1
Tendinopathy and chondromalacia	1	0	0	1	1	0

saturation was achieved. A total of 20 recruits (10 men, 10 women; age = 20.1 ± 1.83 years) who had sustained an LE musculoskeletal injury volunteered for the study. Half (n = 10) had severe injuries. Participant details are presented in Table 1.

Data-Collection Procedures

We aimed to capture the important health outcomes throughout the different phases of injury and recovery. Approval was acquired from the institutional review board before data collection began, and informed consent was obtained before each interview. The primary investigator (T.M.-S.) conducted all individual, semistructured, face-to-face interviews; each lasted approximately 20 minutes. The first part of the interview (Table 2) consisted of 2 questions to confirm the participant met the inclusion criteria and identify his or her current recovery and health status. The second part contained broad, open-ended questions regarding how the injury affected the participant during each phase of recovery. Once each interview was complete, the data were transcribed verbatim.

Data Analysis

The data were analyzed using the general inductive approach,²⁵ which was best suited to answer our research question. Similar to grounded theory, the general inductive approach does not generate open and axial coding. An advantage of the general inductive approach is that key themes are extracted from raw data, often from actual phrases or meanings.²⁵ The first author (T.M.-S.) prepared the raw data by transcribing all interviews verbatim. Two authors (T.M.-S., T.A.E.) then conducted independent reviews and became familiar with the data through multiple

Table 2. Interview Questions^a

Part 1	
1.	Explain your injury and the circumstances surrounding it.
2.	How would you describe your overall recovery and status now?
Part 2	
3.	How did the injury affect you immediately following your injury?
4.	Once your injury began to improve, how did the items you mentioned change as you first began to recover and progressed through rehabilitation?
5.	Did anything new develop as you progressed through recovery?
6.	How did the items you previously mentioned change as you continued to improve and recover in the final or most recent phases of your recovery?
7.	Tell me about important milestones that you remember throughout your recovery, leading up to full recovery.
8.	What were the most meaningful aspects of your health that marked full recovery?

^a Presented in their original form.

readings. Each response provided by a participant became a meaningful outcome. Filler words were removed from the sentences to preserve and emphasize the meaningful outcome. Next, we created categories by grouping commonalities expressed by the participants. Themes and subthemes were identified by drawing connections between the categories and refined during the peer-debriefing sessions.

To improve the validity of the data and ensure accurate interpretation of participants’ responses, we sought feedback from 5 participants.²⁹ All member checks confirmed that the data had been interpreted accurately. Data collection continued until no new themes emerged, signifying saturation. Credibility was also established via peer debriefing.³⁰ The data, theoretical framework, and interpretations were discussed by the research team throughout the data analysis. During the first debriefing session, 2 authors (T.M.-S., T.A.E.) discussed the categories and themes that were generated through the independent review. We shared the agreed-upon themes, along with transcripts and code sheets, with the third author (K.R.S.) during subsequent debriefing sessions. The third author evaluated and confirmed the data and themes.

RESULTS

A total of 530 transcribed responses were identified as meaningful outcomes. Four themes and 21 subthemes emerged from the data analysis (Figure). The themes were physical changes, psychological changes, personal and lifestyle changes, and support.

Physical Changes

Every participant described a variety of physical changes that occurred during injury and throughout recovery and the return to full health.

Range of Motion. Restricted joint range of motion was a commonly reported impairment. A female athlete with a hamstrings strain stated: “The full range of movement was restricted to an extent to where I felt like at a certain point of hurting that I thought I should let up.” A male athlete with an ankle sprain identified: “I couldn’t fully extend my foot. So that was an issue.”

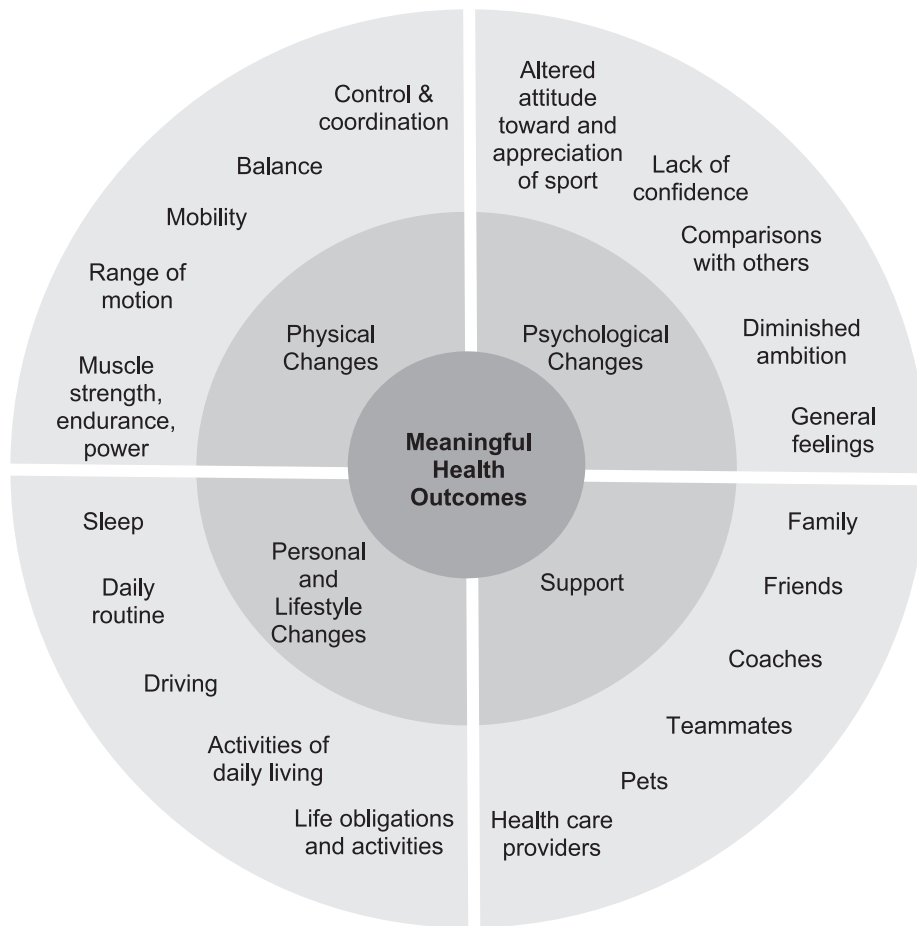


Figure. The 4 themes and 21 subthemes identified as meaningful health outcomes by patients with lower extremity injuries.

Muscle Strength, Endurance, and Power. Every participant described general weakness after the injury. This was reported by a male athlete with an ankle sprain as “It just felt a lot weaker.” A female athlete with an ankle sprain also noted, “I haven’t been able to build up my muscle again back to what I lost.”

Participants also observed impaired muscle endurance. A male athlete with a lateral collateral ligament knee sprain described such impairments when returning to participation: “My stamina wasn’t to par. . . . I realized it when we started drilling hard. I was like, I’m getting tired pretty quickly and I should not be.” A female athlete who had an anterior cruciate ligament (ACL) reconstruction illustrated this concept: “It’s frustrating: from being able to run all the time and now not being able to. Endurance wise [it] is different.”

Muscle power was frequently acknowledged as an impaired body function that affected multiple sport activities. Participants reported a lack of explosiveness and limitations when pushing off or jumping. A female athlete with a hamstrings strain recalled, “Pushing off to field the ball hurt more.” Limited explosiveness, including cutting and jumping, was experienced by several participants. A male athlete with an acetabular labral tear commented, “I don’t really cut like I used to. I can’t. I kind of pull myself back mentally and don’t allow myself to.” A female athlete with Achilles tendinosis shared: “I

felt a lot slower and less explosive.” She further described, “If I felt like I was as powerful before it, it would be huge.”

Balance. Balance was impaired in several participants. A female athlete with a hamstrings strain explained, “I couldn’t balance. I was doing different rehabilitation stuff and getting frustrated that I’d have to use the railing.” A male athlete with an ankle sprain had the same concern: “I definitely couldn’t stand on that injured leg. My balance was off.”

Impaired involuntary movement reactions that did not include balance functions were also present. A volleyball athlete gave examples of specific movements and reactions that represented health and full recovery:

It is important for me to make strong moves towards the ball. . . but once I had my ankle injury. . . that would make me super slow towards movements. I wasn’t the same moving towards balls. I was always late because I was still moving or I’d move one way and the ball would go the other way.

Control and Coordination. Deficient control and coordination of movements were experienced by participants. A female athlete with an ankle sprain observed, “During conditioning, I don’t feel as quick in my sprints any more. I was probably one of the quicker ones. Right after it happened, I was very tentative. Especially with the turning.” A male athlete with a torn acetabular labrum

noted an important milestone in recovery as “just being able to use my strength and quickness at the same time and not have to hesitate.”

Mobility. Every participant in this study identified functional impairments in movement patterns related to walking or running. Several individuals portrayed performing a full-speed sprint as a meaningful aspect of health that denoted complete recovery. Typically, participants remarked that walking was impaired, resulting in a limp. A female athlete with an ankle sprain expressed, “I couldn’t walk barefoot around my house. It took a very long time to walk like a normal person, even into the kitchen.” Participants also discussed difficulties they experienced when attempting to run and sprint, especially decreased speed. A female athlete who had an ACL reconstruction stated, “I couldn’t run as fast as I usually could.” One of the most noteworthy responses came from a male athlete who had fractured his medial malleolus: “You don’t really realize how much you take walking for granted. Because when I was coming back, I had to relearn how to walk normally.”

Participants frequently commented on the challenges of moving around but most notably while using stairs. This was illustrated by a female athlete with an ankle sprain: “Stairs were terrible. And they still are. . . . I still feel pain going up and down stairs. I’m very cautious. I try to avoid them as much as I can.” A male athlete with an ankle fracture also noted,

I had to go to buildings that had an elevator. It was difficult to get to class because you had to make sure you went to floors where there were elevators and had to figure out the best route to get there on time and everything. I couldn’t do stairs.

Moving around is an aspect of everyday life; however, in the context of sport, it is regarded much differently. Hurdling, spinning, lateral movements, cutting, backpedaling, top-speed sprinting, rotational push-offs, and moving while making contact with other players are all important factors that contribute to health in the athletic population. Furthermore, the speed and force generated in each movement also serve as contributing factors.

Many participants described limitations in important activities that often restricted their full recovery. They were participating in their chosen sport but lacked the ability to move effectively in a variety of ways. Their limitations were individualized, depending on the movements required for their sport and position. For example, a male athlete recovering from an ACL reconstruction had difficulties “stopping and starting, changing direction.” The inability to reach a “top end speed” and challenges in cutting were also reported. A male track-and-field athlete with an ankle sprain described problems “spinning and putting rotation on my foot.” A female athlete explained, “Doing a back step is when it affected me.” A men’s track-and-field athlete with an ankle sprain experienced difficulty while hurdling:

One thing was getting my feet down quick enough on the other side. There’s a rhythm you have to hit every time; otherwise it throws you off completely. If your rhythm is off even a little bit, you’re done for. Once you get to a

certain point, it is involuntary and that’s where I was before the injury. It became more of a voluntary thing after the injury because there was so much time off of it. It just made me think, “OK, I need to really focus on doing this again,” versus just being able to run through it.

Moving in and out of body positions was problematic for several participants. A female athlete with a hamstrings strain said, “Every time I sat down it hurt.” Getting in and out of bed was also a challenge, as illustrated by a female athlete who had ACL reconstruction: “My roommate had to help me into bed. Because I couldn’t lift my leg by myself. She had to lift it for me.” Another female athlete who underwent ACL reconstruction expressed:

My family went to a Catholic school and church. And I remember being so embarrassed because there’s one part when you have to kneel. And I couldn’t kneel. It would be too much of an angle for me, so I’d always have to sit down. I felt weird being the only one sitting.

Similar to changing body positions, being able to stay in the same position was a frequent limitation after injury. A female athlete with a hamstrings strain identified “sitting in class, because I didn’t want to sit through pain” and “Sitting down, during a long car ride really hurts.”

Psychological Changes

For some, the mental aspects of injury and recovery were even more burdensome than the physical aspects. A female athlete who sustained an ankle sprain illustrated this concept: “For the most part, the physical things were the easy part of things, compared to the mental things.” The psychological effects had 5 subthemes.

General Feelings. Throughout recovery, participants dealt with an array of emotions, including sadness, worry, fear about the future, and frustration. Sadness was one of the most commonly reported emotions. A female athlete who had recovered from an ACL reconstruction explained: “At first, it was like life or death. It’s what it felt like.” In the same way, a female athlete with a hamstrings strain replied, “I was just really down, upset and wondering why.”

Health care professionals provide their best prognosis; however, often, the exact recovery period may be somewhat uncertain. Participants in this study cited the emotional stress caused by the unknown duration of healing and recovery. A male athlete with an ankle sprain stated, “One thing that messed with me mentally was not knowing how long I’d be out.”

Lack of Confidence. Participants also identified feelings of trepidation about returning to sport. A female athlete who had recovered from an ACL reconstruction recalled that “things were always scary at first.” A female athlete with a hamstrings strain acknowledged her insecurities: “I was always nervous. Always in the back of my mind thinking, am I going to get hurt this time?”

Throughout recovery, participants felt frustrated. They also dealt with frustration as they began involvement in their sport again. A female athlete with an ankle sprain observed,

I wasn't confident anymore in anything that I was doing. That was really frustrating because normally everything has been natural for me, so I've never really had to think about it. Then when I came back, I had to make adjustments.

Participants were overcome by emotional exhaustion, and their statements revealed the emotional adversities experienced during the recovery process. A female athlete with a sprained ankle stated, "Mentally, it's emotionally draining." She also expressed an aspect of health that represented full recovery as "Once I can feel, I don't know the word, free again comes to mind; not having that weight, the burden of an injury weigh on me."

Comparisons With Others. Participants in this study frequently compared either themselves or their injury with others. Comparisons with their teammates were most commonly reported. A female athlete who had undergone ACL reconstruction explained,

I'd never had surgery or any major injuries up until this point. You didn't know what to expect but other teammates had gone through it. And they didn't have a good experience with it, so I knew I'd have to go through that.

A female athlete with an ankle sprain echoed that sentiment:

Another player sprained her ankle a week later. I was finally coming back and she caught up to me in a day. That was super frustrating. I've been trying to do stuff for a week, and she probably has a worse ankle sprain than me.

A male athlete who underwent a meniscus repair offered a positive comparison: "Seems like I was ahead of schedule in terms of that stuff. There was another kid that had surgery 2 weeks before, the same surgery. When I was walking, he was still on crutches."

In some cases, the participants identified themselves as different people after injury. A female athlete who had an ACL reconstruction described how "it makes you a different person. You look at things differently. Not everyone knows what you go through. But it makes you stand out that you can recover from that." Along with a different self-identification, feeling that others were noticing their differences was also discussed. A female athlete who underwent ACL reconstruction depicted a meaningful aspect of health that marked full recovery as not feeling on display to others: "People would just look at me. I felt like I was kind of an exhibit to look at. Once I got the full range of motion, I was like, I don't have to be that person anymore."

Altered Attitude Toward and Appreciation of Sport. Participants also revealed altered perspectives regarding their collegiate sport participation. A female athlete with a hamstrings strain said, "My attitude towards playing changed. I go into each game playing like it's my last. Wanting to be in it more and giving it my all, because you never know when I won't play again."

Other accounts provided the opposite outlook. A male athlete who had undergone a second ACL reconstruction remarked:

It takes a little love away from the game . . . There's a lot of question, for the second time, if I even wanted to go through rehabilitation again and get back on the field. It's awful. It's dark. It's not fun.

Diminished Ambition. For some participants, the motivation to pursue endeavors dwindled. A female athlete who sprained her ankle illustrated this: "I was tired, emotionally drained. I was starting to, not necessarily slip away, but everything seemed out of my control a little bit." Similarly, a female athlete who had ACL reconstruction noted, "I didn't know what to do. I was on the couch. Just kept wondering when it's going to end."

Personal and Lifestyle Changes

Sleep. Sleep was affected among participants who sustained moderate and severe injuries. Pain contributed to the inability to sleep. A female athlete who underwent ACL reconstruction stated, "I didn't sleep for a week for sure; for 2 weeks, probably. You can't turn, can't get comfortable." A female athlete with a sprained ankle had similar thoughts: "Sleeping was affected; I would wake up and it would be throbbing."

Another concern that negatively affected sleep was the inability to access one's bed because of stairs, as portrayed by a female athlete after ACL reconstruction: "The stairs were too much of a challenge. . . . I was on the couch the whole time." Many participants lived in the dormitories and reported that their bed was lofted, which meant having to sleep on couches or in other locations. A female athlete who had her ACL reconstructed recounted: "I lived in the dorms during that time, and my bed was lofted. So I couldn't get into my bed. So that was a problem. So I had to sleep on friends' couches."

Daily Routine. Participants often alluded to the modification of their daily routine after injury. Most notably, they struggled as they lost their independence while injured and throughout recovery. A female athlete who had ACL reconstruction disclosed, "It was hard having to rely on other people to help you out throughout the whole recovery. It was frustrating because I had to keep asking someone else and you wanted to do it by yourself." A female athlete who sustained an ankle sprain felt similarly: "It was nice to get off crutches and be able to do things for myself. . . . I felt more independent and didn't rely on other people."

For some, the daily routine, including academics, was altered because of the time spent in rehabilitation. A female athlete with an ankle sprain explained,

I thought I'd have all of this extra time. If I'm not practicing, I will get homework done. But rehabilitation is taking over and also going to practice. I feel like I have so much less time to do homework. I'm a little more in control now, but I want it to go back to normal and not have to do treatment.

A male athlete who underwent ACL reconstruction shared the emotional effect of carrying out a different daily routine:

It still takes a little love away from the game. It really does. As opposed to me just showing up for practice

every day. Now I have to show up for rehabilitation twice a day and then go to practice. So it's more "job feeling" now. It's not as youthful as it once was.

Driving. Participants frequently had driving limitations. A male athlete with a meniscal repair noted, "I couldn't drive for probably a month, which wasn't fun." Similar comments were given by a male athlete with a hamstrings strain: "Driving was difficult. Because you're stuck in that position for a long time and it would tighten up." The inability to drive affected other areas of participants' lives, as related by a female athlete who had an ACL reconstruction: "I couldn't drive. I didn't have much freedom with that, so I felt like I couldn't commit to anything."

Participants also discussed their difficulties as a passenger in a car. A male athlete who had a meniscal repair noted, "Right away it was tough getting in and out of cars because I had to wear a brace that was locked out. I had to sit in the back seat of cars."

Activities of Daily Living. Another theme that emerged from the data was that a number of participants experienced limitations when caring for themselves, including dressing. This restriction was cited by a female athlete with an ankle sprain and detailed by a female athlete after ACL reconstruction: "Even getting dressed, it sounds stupid, but I couldn't put my pants on. I couldn't bend my knee. My roommate had to help me get dressed in the morning. It was rough." A male athlete with a hamstrings strain agreed: "Putting on clothes was hard, especially my shoes. I couldn't bend down like I normally do to put them on. That was the most difficult part."

Participants also encountered difficulties bathing. A female athlete with a hamstrings strain explained, "Even standing in the shower was difficult." A male athlete with a meniscal repair also faced such difficulties: "Showering was awful. I used the handicapped stall in the dorms. And had to wait if it wasn't open because there's no room."

Life Obligations and Activities. Participants shared the complexities of dealing with major obligations, such as school and jobs. Several participants said their academic activities were affected after the injury. A female athlete with an ACL reconstruction recalled restrictions during class registration:

The big thing was registering for classes. I'm an exercise science major and I wasn't able to do any of the fitness classes... Just because it wouldn't help my grade because of all the things I couldn't do. So I remember being told this fall that I could do that. It was a big thing because I wasn't limited.

A female athlete with an ankle sprain concurred:

My schoolwork was affected. Because I was tired, emotionally drained. I was starting to, not necessarily slip away, but everything seemed out of my control a little bit. It got a lot easier to get it back as I got healthier.

A female athlete who underwent an ACL reconstruction continued in the same vein:

Right after I found out I tore my ACL, I kind of lost it like mentally. I had 2 or 3 tests and those were my last tests in those classes, so my grades dropped immensely from that. So I didn't do well on my tests and there was no coming back from that. I struggled with the grade part.

One participant had difficulty focusing his attention in class after an ankle fracture:

It rearranged your focus, like sitting in class for 2 hours and your foot would be throbbing. . . You'd lose track of the topic and start thinking about your foot and try to figure out what's on the board.

Aspects of work were significantly affected after injury in some participants. A male athlete with an ankle sprain said,

I work in the mornings before school and I wasn't allowed to go back to work. Basically what I do is sort packages at UPS, so I wasn't allowed to work there for 2 weeks, which hurt my bank account a lot.

The inability to engage in community social life after injury was identified by certain individuals. A female athlete who had an ACL reconstruction revealed, "I was involved with other organizations, like 'best buddies,' and couldn't do any of that."

Involvement in their collegiate sports was an extremely important aspect of health reported by every participant. The magnitude of returning to sport was illustrated by a female athlete with an ankle sprain: "Coming back to full-on 6-on-6 volleyball play with live swings was the thing that meant the most." A male athlete who had a meniscal repair agreed: "Being able to get back on the floor. That helped more than anything." For some, not being able to participate in sport had a more substantial effect on their life. They felt as though they were missing out or being left out. A female athlete with a metatarsal fracture recounted, "I couldn't run with [the] team and missed out on what they talk about on runs."

Competitiveness was evident regardless of whether athletes participated in an individual or team sport. A female athlete with an ankle sprain described, "Emotionally, it hurts when I have to see my teammates getting better and better and improving, and I'm stuck in this injury bubble." A male athlete with an ankle sprain expressed similar comments: "I kind of got down on myself. You see teammates at practice each day getting better, and getting better than you. I wanted to be the best I can, and this is preventing me now. It's annoying."

Feelings of obligation to the team and needing to contribute were typical. A male athlete with patellar tendinosis stated, "It took a toll on me because I had to sit out for a while. I couldn't contribute or just play in general." A male athlete who had ACL reconstruction felt the same: "Your team's out there working and you're stuck on a couch." Several other participants conveyed the importance of being part of the team. A female athlete with an ankle sprain remarked, "I couldn't practice, but I still show[ed] up because I wanted to be a part of the team. I scheduled my rehabilitation at a different time to make sure that I was at practice."

Their sport activity was not the only recreational and leisure pursuit that was important to many participants. A female athlete who underwent ACL reconstruction discussed her limitations:

Skiing and tubing was a big one because I loved to do that. Another one was horseback riding. That was a big thing, but I couldn't do it, because it was during recovery and it was a lot for my knee and there was [a] risk of falling off.

A female athlete with Achilles tendinosis shared, "On the weekends, I used to shoot basketball hoops with my brother, but didn't do that anymore because I didn't want to risk anything."

For many, their recreational activities involved interaction with other individuals, such as family, friends, and pets; being unable to pursue these resulted in social consequences. A male athlete with a sprained ankle revealed: "At home, I didn't go out as much, like do things with my friends, like go out to eat."

Participants also expressed how their injury kept them from pursuing normal activities with their pets. A male athlete with patellar tendinosis discovered an alternative: "I couldn't run around with my dog. I still found a way to play with her though." A male track-and-field athlete with an ankle sprain noted, "I normally walk my dog when I go home and I didn't do that. He just sat there and looked at me sadly. That really hurt."

Support

Family. Family served as an important support system for many participants. A male athlete with an ankle sprain acknowledged, "Talking to my parents and family helped me get through the injury." Another account of such support was offered by a male athlete who had ACL reconstruction:

My parents babied me. I went back to [a] very infantile phase. They were like, "Lunch is in the fridge." They made me breakfast before they went to work. And then we had dinner when they got home.

Friends. A number of participants identified ways in which their friends assisted and supported them throughout recovery. A female athlete who underwent ACL reconstruction remembered: "My roommate had to help me into bed because it still wasn't low enough. Because I couldn't lift my leg by myself, she had to lift it for me." A female athlete with an ankle sprain concurred: "My roommates have to take me around everywhere." Similarly, a male athlete who had a meniscus repair explained, "I had to get my roommate to do my laundry for me."

Teammates. The support offered by teammates was an influential component in the recovery process. A male athlete who had ACL reconstruction recalled:

The guys would pass me on the way to practice and say, "How ya doing man, I miss ya," and stuff like that and that feels nice. It made me think, I can push through this, I'll get back out there. But it almost takes some support to feel any better.

Coaches. Coaches also played an important role in supporting the participants throughout recovery. A female athlete with a hamstrings strain said, "My support system has helped me through, especially my coach. His number-one priority was to make sure that I could run here. If I didn't have a coach like that, I would feel really down." Similarly, a male athlete with an ankle sprain noted: "The coaches helped me through too, because they were patient. They understood what was going on."

Pets. A male athlete who underwent ACL reconstruction shared how his dog helped him through recovery: "My little dog was there, and I hung out with her all day. Those were the light spots."

Health Care Professionals. A variety of health care professionals affected patients' recoveries. Some participants experienced negative consequences due to miscommunications or misdiagnoses. A female athlete with an ACL reconstruction described her misfortune:

There was miscommunication with the physical therapy I had. They thought that they weren't supposed to bend it. So they just did massaging treatment for the whole summer, which caused a lot of scar tissue. . . . So then I went in to do a manipulation.

Athletic trainers were highly regarded for providing significant support to participants and facilitating recovery. A female athlete with a hamstrings strain commented, "I was really excited when I found out that I could work with the AT. It was awesome, because I was like 'I'm going to be with someone that knows what she's doing.'"

DISCUSSION

Our purpose was to identify experiences and meaningful outcomes after LE musculoskeletal injury among collegiate athletes. The current findings confirm the importance of resolving physical impairments, as represented by the Hertel and Denegar³¹ progressive model for rehabilitation of physically active individuals; our participants indicated that each of the elements identified by the model was important in their recovery. The model begins with foundational goals, such as tissue healing and relieving pain, followed by secondary goals such as restoring range of motion, strength, and coordination, with the pinnacle being the return to functional activities. However, other components, specifically psychological functions, sleep, activities of daily living, life obligations, and support systems, may also need to be at the forefront of routine patient care.

One of the most salient findings was the importance of formally assessing sleep. Vela and Denegar²² reported that injured athletes had difficulty maintaining a sleeping position. Although our participants also cited difficulty maintaining position, especially during sleep, sleep concerns extended beyond position. We cannot gauge whether sleep was affected because of pain or stress from the injury. Statements such as "I had trouble sleeping" and "I didn't sleep for a week for sure; for 2 weeks, probably" illustrated the influence of injury on sleep. In discussing the hardship of dealing with his injury and studying for final examinations, a participant recognized the role sleep played in a successful outcome. These findings revealed that partici-

pants with severe injuries, some of whom required surgery, experienced similar sleep impairments as those who sustained moderate injuries, such as ankle sprains. The amount and quality of sleep affects individuals on many levels. Increased time sleeping has been positively associated with athletic performance,³²⁻³⁴ along with daytime alertness, reaction time, and mood.³⁵ Van Ryswyk et al³⁶ similarly revealed that increased sleep time corresponded with increased vigor and decreased fatigue among athletes in the Australian Football League. Our results support this previous research: sleep was a meaningful aspect of daily life that was affected by injury. Athletic trainers should consistently account for sleep as a meaningful consequence of injury and assess it accordingly.

Compared with previous authors,²² we found a more distinctive account of meaningful outcomes in regard to daily activities. Participants identified several other personal and lifestyle changes, including daily routine, self-care, and life obligations. More specifically, being able to dress oneself, take a shower, prepare meals, and do housework were resounding themes described by our participants. These items were not restricted to individuals who underwent surgical procedures. Those with moderate injuries that did not require surgical intervention, such as a hamstrings or ankle sprain, were similarly limited in the ability to care for themselves.

These findings are significant, indicating the importance of defining aspects of daily life that should be assessed to determine the realm of functioning and disability experienced by patients. Outcomes related to self-care are commonly assessed among the general population; however, health care providers who primarily tend to athletes may be overlooking these important factors because they tend to focus on activities that directly relate to sport participation.^{37,38} Managing self-care is not a necessary activity for sport participation but contributes to overall health.

The current study offers unique insights into the negative effects of injury on the ability to carry out tasks and actions required to engage in education and work. Participants discussed the negative implications of their injuries on academic activities. An array of limitations was noted, including registering for and attending class, remaining focused while in class, and studying, which affected some participants' grades. Participants also expressed how their injuries negatively altered their jobs and income. These life obligations carry significant weight in one's life, placing substantial stress on an individual who is unable to execute such tasks and actions. Our results suggest that health care professionals must account for major life areas, including school and work, and make every effort to support the patient's continued involvement.

Another important finding was that participants felt overwhelmed by their new routine after injury. Rehabilitation became part of their daily regimen while they maintained other aspects of life. This is consistent with an investigation³⁹ of patients recovering from autologous chondrocyte implantation who acknowledged that, at times, the recovery process became secondary to other priorities in life. Based on these findings, health care professionals need to recognize such time constraints and make every effort to efficiently maximize rehabilitation services.

The current results offer additional insight into the potential role of returning to sport participation as a

meaningful outcome for collegiate athletes. Specifically, sport participation could be considered a final or highest-level outcome because it demands functional ability that could be associated with optimal health or a pinnacle outcome. Sport participation was important, as it was identified by all 20 participants as a significant aspect of health, as well as a central recovery milestone. Previous researchers noted this concept.^{22,40} Vela and Denegar²² described sport participation as a meaningful outcome for collegiate athletes, and Houston et al⁴⁰ observed that among injured athletes, those who were able to participate in their sport reported a better health-related quality of life than those who could not. However, sport participation was not consistently identified as a primary factor that denoted full recovery. Six participants who had already returned to their sports recognized they were not yet fully recovered. This is an important consideration and should be accounted for by health care professionals when assessing outcomes among athletes or other patients with a high level of ability. Our findings indicate that it is inappropriate to correlate recovery (or full recovery) with participation status. Health status and full recovery are complex and should not be determined using a single measure. Even while participating without limitations, athletes still report important and meaningful functional impairments, activity limitations, and participation restrictions outside of their chosen sport.

Additional notable findings unique to athletes involve the specific demands of sport and the meaningful outcomes identified by participants in 7 sports. Although the functional requirements of sport participation have been presented in earlier research,²² the current results expose meaningful high-level outcomes as precise and specific to the skills needed for a sport. The individual requirements for sport participation, all of which served as markers of full recovery, were meticulously described by several participants. This suggests that although an athlete was able to participate in his or her sport, a specific component of function that had yet to return to preinjury status was keeping the athlete from self-reporting as "normal" or "healthy." If we reflect on the idea introduced by Jette³ that we should track function and disability rather than specific impairments, such as strength or range of motion, this final missing outcome link representing full recovery for athletes seems to point back to measuring specific impairments. Conversely, we suggest that the missing outcome recovery link simply represents a patient- or sport-specific level of function and ability. Yet it was apparent that the athletes best understood their sport and individual responsibilities. Therefore, health care providers must comprehend the specific and individual demands of sport and the limitations caused by injury. This construct of sport specificity raises the question of whether we can realistically capture our patients' outcomes with any universal measure rather than a patient-specific model or an adaptive instrument.

Another important discovery was the importance of involvement in recreational and leisure activities outside of one's collegiate sport as meaningful aspects of health. Several participants identified recreational activity limitations in dancing, hunting, fishing, golfing, horseback riding, tubing, and playing sports other than their collegiate sport. Some participants were unable to join in certain activities with their siblings, friends, or pets. Certain individuals described how their injuries produced an altered and

somewhat adverse view of their collegiate sport participation. One person shared how injury “takes a little love away from the game” and can result in more meaningful participation in other recreational activities. It is vital to keep in mind the full realm of recreational and leisure activities that are highly valued by patients and contribute to health and recovery.

Clinicians rely on patient-reported outcome instruments to provide a comprehensive assessment of health and disability. Although no foot and ankle patient-reported instruments have been validated for patients with high-level abilities, research^{9,41,42} suggested that the FAAM is an appropriate instrument for evaluating patients with these conditions. Yet instruments such as the FAAM typically do not address several meaningful aspects of health, as emphasized by our findings. For example, the FAAM, the 12-Item Short-Form Health Survey, and the Lysholm Knee Score do not specifically assess sleep, the ability to drive, support, and several sport-specific activities (eg, balance and generating power) that our participants reported as meaningful aspects of their health.

For patients such as collegiate athletes, who present with a high level of ability, our results reinforce several emerging themes for outcomes assessment in this clinical population and offer novel insights as well. For example, the effects of injury on a patient’s lifestyle and personal life, psychological changes, and the need for social support are not necessarily new but are emerging as important areas for outcomes assessment. Too often, we focus on the physical toll an injury has on the patient and only monitor the patient’s ability to recover from somatic changes. Throughout recovery, we should be assessing our patients’ emotional, psychological, and social outcomes as well. These themes may represent an undervalued aspect of AT–patient interactions and could serve as a valuable component in monitoring patient outcomes, both in research and in practice.

CONCLUSIONS

Identifying outcomes that are important to patients is a crucial step in delivering effective patient care. In addition to physical changes, our participants identified psychological changes, personal and lifestyle changes, and social support as meaningful factors during their recovery from LE musculoskeletal injuries. This suggests that ATs must take a broader approach when evaluating the effect of an injury on a patient’s quality of life and the outcomes related to the patient’s recovery. It is important for ATs to account for the complex relationships among all the variables revealed in our participants’ experiences. Because these were identified as important by the individuals themselves, they should be assessed and reevaluated throughout the recovery process. Overall, these themes reinforce the need to understand our athletic patients’ values in the framework of evidence-based practice and provide a foundation for identifying and selecting the markers of health and the outcome measures that are appropriate to our patients.

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