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Adolescent Patient, Parent, and Clinician Perceptions of Rehabilitation After Anterior Cruciate Ligament Reconstruction: A Qualitative Study

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Context: Rehabilitation after anterior cruciate ligament reconstruction (ACLR) is challenging for adolescent patients concurrently experiencing growth and development, changes in attitudes and social interactions, and a gradual shift toward independence.

Objective: To examine the perceptions of information sharing and interpersonal communication among adolescent patients going through ACLR, their parents, and physical therapists (PTs) treating adolescent patients with ACLR.

Design: Cross-sectional study.

Setting: University-affiliated sports medicine clinic.

Patients or Other Participants: Nine adolescent patients who had recently completed physical rehabilitation after ACLR, one of their parents, and PTs who treated adolescent patients with ACLR were recruited and enrolled.

Main Outcome Measure(s): Participants completed semi-structured interviews. The interview scripts for patients, parents, and PTs intentionally addressed the same topics, with only minor modifications in wording as appropriate for each role. All interviews were recorded, transcribed verbatim, and analyzed using a hybrid of deductive and inductive coding by trained members of the study team.

Results: Patients, parents, and PTs perceived that interpersonal dynamics (eg, communication, external motivation) and stakeholder knowledge (eg, understanding of the psychological consequences of injury) influenced intrapersonal experiences (eg, emotional response, intrinsic motivation) during rehabilitation after ACLR. Additionally, patients and parents indicated that a lack of information about the rehabilitation process hindered their ability to obtain additional information from the PT and surgeon.

Conclusions: Participants from all stakeholder groups reported that orthopaedic surgeons and other members of the health care team may consider being more consistent when setting expectations, physical restrictions, and recovery timelines.

Key Words: health care communication, patient education, psychology

Key Points

- Interpersonal dynamics and stakeholder knowledge had a meaningful effect on the intrapersonal experiences of adolescent patients and their parents during the rehabilitation process.
- All stakeholder groups agreed that increased frequency of communication among the members of the health care team would be beneficial in ensuring that patients were meeting progress expectations and all members of the health care team had a shared understanding of the patients' needs and desires.

Physically active adolescents and young adults have experienced the greatest increase in the prevalence of anterior cruciate ligament (ACL) injury and ACL reconstruction (ACLR) over the past 2 decades.[1] Although more than 86% of patients who underwent ACLR believed they would return to their preinjury levels of sport participation within 6 months of surgery,[2] only 65% reported returning to their preinjury level of sport participation within 1 year of surgery.[3] These findings highlighted a significant disconnect between patients' knowledge and expectations of the recovery process and the current reality for recovery after ACLR. Previous researchers[4] have focused on changes in access to organized sport due to transitions between academic (eg, high school to college) or sport (eg, recreational to organized club) levels that occurred during adolescence as a potential source of the disconnect between expectations and the reality of recovery. However, adolescent patients may have encountered other significant challenges to developing realistic recovery expectations based on several intrapersonal and interpersonal factors that may or may not have been related to their injury. For example, adolescents experienced rapid changes in their social interactions, development of a more defined personal identity, and a

gradual shift toward independence from parents as they physically and cognitively matured.[5,6] As these patients worked through their rehabilitation process after ACLR, a collision occurred between the rapid physical and psychological changes brought on as a result of the injury and the physical and mental development that is inherent in adolescence. Consequently, it is important that we understand how interactions with individuals involved in their rehabilitation (ie, parents and physical therapists [PTs]) affect patient perceptions of the rehabilitation process as well as how these interactions could be improved.

In a number of qualitative studies,[2,3,6–8] adolescent patients with ACLR identified intrapersonal and interpersonal factors that affected their rehabilitation process in a meaningful way. Among the most commonly reported factors that negatively influenced the perception of rehabilitation was a lack of knowledge or information about the rehabilitation process and inconsistency in the information available to or provided by clinicians involved in their treatment.[5,6,8] According to Paterno et al,[8] adolescent patients and their parents agreed that access to educational resources was a key to success in rehabilitation after ACLR and that successful rehabilitation experiences involved the treating PT acting as a guide, educator, and coordinator. In these roles, effective PTs were able to ensure that patients understood the rehabilitative process and had realistic expectations for recovery. For recovery to be successful, patients and parents indicated that consistent communication of patient goals and progress, coordination of care strategies, and development of PT-patient relationships were positive reinforcers.[2] The transfer of information between the health care provider and patient was important to confirm that the patient understood the timelines to recovery. Parent involvement may have further complicated that transfer, as previous researchers[5] showed that adolescent patients felt that their parents were supportive but did not thoroughly understand their lived experience.

Despite attempts to describe and compare the perceptions of the rehabilitation process among adolescent patients and their parents,[8] the perceptions of individuals outside the family unit, such as PTs, had not been investigated. Developing a more nuanced understanding of stakeholder (ie, patient, parent, and PT) perceptions of interpersonal communication and consistency of expectations would enable researchers and clinicians to provide specific recommendations for interpersonal communication and information sharing. Therefore, the purpose of our study was to examine the perceptions of information sharing and interpersonal communication among adolescent patients recovering from ACLR, one of their parents, and PTs who provided rehabilitative care for adolescent patients with ACLR. Our exploratory purpose was to summarize the recommendations of patients, parents, and PTs for improvements in rehabilitative care after ACLR.

METHODS

This qualitative research study was designed and executed in accordance with the Consolidated Criteria for Reporting Qualitative Studies.[9] Adult participants provided informed written consent. Participants who were minors provided written assent, and a legal guardian provided written consent. This study was approved by the Michigan State University Institutional Review Board for Biomedical and Health Sciences.

Participants

Participants with ACLR were recruited from a university-affiliated sports medicine clinic and treated by 1 of 5 orthopaedic surgeons. Participants were part of a larger ongoing study assessing clinical outcomes after ACLR and were referred between 4 and 6 months after ACLR. They were included in this study if they were involved in high school athletics at the time of ACL injury, had undergone subsequent ACLR, were able to walk without assistance, and had not been cleared by the orthopaedic surgeon for unrestricted activity but were planning on returning to sport. We selected this specific time point in the rehabilitative process (ie, before clearance to return to sport) because we wanted to (1) ensure that patients were still engaged in the rehabilitative process and (2) minimize the likelihood that success or lack of success in return to sport would influence their perceptions of the rehabilitative process. Volunteers were excluded if they had unexpected surgical complications or were unable to take part in physical activity due to a previous medical condition.

Parents of participants with ACLR were recruited at the same time as their children and were included in this study if they cohabitated with their child at least part time and had attended both the preoperative clinical visit with the orthopaedic surgeon and the first postoperative session with the PT responsible for management of rehabilitative care. At the time of the interview, parents were asked to provide the name and contact information of the treating PT. The first 3 patients and parents were interviewed in person, whereas the remaining participants were interviewed via online video conference (Zoom Video Communications, Inc) due to COVID-19. We then contacted the PTs via phone or email to recruit them. If a PT chose not to participate or was unable to be contacted, he or she was replaced by a PT from a local nonuniversity-affiliated outpatient physical therapy clinic (1 of 9 PTs on staff). All PT interviews were completed via online video conference.

Preinterview Data Collection

Participants with ACLR completed the Tegner Activity Scale to quantify peak physical activity level before the ACL injury.[10] Surgical characteristics and participant demographics were collected using a standardized intake form and confirmed via chart review. Parents of participants with ACLR completed a demographic questionnaire and a 3-item assessment of household socioeconomic status: household income, peak education level, and employment status. The PTs completed a demographic questionnaire and a 4-item survey that characterized their years of experience, highest degree level, additional training or certifications, and the average number of patients with ACLR they treated in each of the previous 3 years.

Semistructured Interview

After completing the patient-reported outcome measures, each participant completed a semistructured interview conducted by a male study member (C.M.K.) who was an assistant professor at Michigan State University. The primary

interviewer had been engaged in qualitative research for 5 years and was trained to perform the interviews included in this study by a study team member (K.E.) who had studied qualitative methodology extensively. Participants with ACLR and their parents had no prior relationship with any member of the research team. However, the interviewer had been a member of the local sports medicine community for 6 years and therefore had previously engaged with several of the PTs included in this study. The interview guide used in this study (see the Supplemental Material, available at https://doi.org/10.4085/1062-6050-0491.21.S1) was developed based on scripts from 2 previous studies completed by the study team and was refined through discussion among the team after 2 pilot interviews.

The interview process began with an initial rapport-building phase that was specific to the stakeholder being interviewed. After rapport was established, the interview covered topics including the stakeholder's approach to the rehabilitation process, communication and information sharing among stakeholders, and factors that positively or negatively affected the stakeholder's perception of the rehabilitation process. Although the interview guide served as a framework for each interview, the interviewer emphasized that participants had the freedom to explore additional topics as they saw fit. Interviews ended when participants indicated that they had no additional information to contribute, and they wished to conclude the interview. They were instructed to contact the interviewer within 7 days if they had information to add to their transcript. Each interview was audio recorded, with field notes taken by the lead interviewer in the event of recording failure. General conceptual saturation was evaluated via consensus of the research team, at which point recruitment was halted.

The audio recording of each interview was transcribed using an automated, online service (Kaptura Technologies), and the resulting transcripts were corrected by 2 graduate research assistants (N.F. and J.L.). The research assistants were not blinded to the stakeholder group, as the questions varied slightly for each group. However, they were blinded regarding which patient was associated with which parent and PT. Transcripts were not returned to the participant for correction or feedback. However, within-interview checking strategies (ie, continuous echoing and asking for correction) allowed participants to correct researcher interpretations to improve data validity and credibility.[11]

Interview transcriptions were analyzed in a 3-stage process: (1) blinded inductive thematic and subthematic coding, (2) between-stakeholders comparisons of inductively derived emergent subthemes in each inductive primary theme, and (3) review and verification of the emerging thematic structure. Themes and subthemes were first identified irrespective of the stakeholder group through an iterative process involving discussion and debate until conceptual consensus was achieved among 4 research team members (C.K., N.F., J.L., and K.E.). These themes were then consolidated for a concise thematic narrative. Stakeholder comparison involved examination of the coded participant transcripts by 2 unblinded team members (N.F. and J.L.). Then similarities and differences among the stakeholder groups were discussed by the 4 members of the research team (C.K., N.F., J.L., and K.E.). Each team member reviewed the analysis notes, results, and illustrative examples to validate—and potentially challenge—the conclusions. Excerpts exemplifying the key themes and stakeholder-specific comparisons were then identified.[12] Finally, to establish credibility by verifying the results of the emerging thematic structure, the coded transcripts and data-analysis notes were shared for independent evaluation with an external reviewer (C.M.L.) with qualitative sports medicine research experience who had not been previously involved in the study.

Table 1. Patients' Characteristics[a]

Patient	Sex	Age, y	Months Since Surgery	Graft Source	Preinjury Tegner Activity Level
1	F	15	6.0	PT	9
2	F	17	5.1	HS	10
3	F	17	5.4	PT	8
4	F	14	9.2	PT	10
5	F	18	4.7	HS	9
7	F	17	9.1	HS	9
8	M	15	4.8	HS	7
9	F	14	4.2	HS	10
10	M	14	5.0	HS	10

Abbreviations: F, female; HS, semitendinosus autograft; M, male; PT, patellar tendon autograft.

[a] After enrolling, Patient 6 opted not to complete the interview due to time constraints.

RESULTS

Characteristics of patients are reported in Table 1, of parents in Table 2, and of PTs in Table 3. Interviews ranged in length from 20 to 52 minutes. Median lengths were 30 minutes for patients, 29 minutes for parents, and 34 minutes for PTs.

Inductive Themes and Subthemes

The qualitative analysis yielded 3 primary, higher-order themes: (1) interpersonal dynamics, (2) stakeholder knowledge, and (3) intrapersonal experiences. However, during our analysis, it became clear that both interpersonal dynamics and stakeholder knowledge during the rehabilitation process had meaningful effects on intrapersonal experiences, which resulted in our final thematic structure (Figure). Lower-order subthemes were nested within each of these 3 higher-order factors. Additional quotes supporting each theme and subtheme can be found in the included Supplemental Material.

Table 2. Parents' Characteristics[a]

Parent	Sex	Age, y	Highest Level of Education	Annual Household Income, $
1	M	43	Associate's	50 000–74 999
2	F	47	Graduate	75 000–99 999
3	F	44	High school	100 000–124 999
4	F	43	Bachelor's	100 000–124 999
5	F	41	Bachelor's	75 000–99 999
7	M	42	High school	75 000–99 999
8	F	39	High school	40 000–49 999
9	F	50	Bachelor's	125 000–150 000
10	F	42	Bachelor's	>150 000

Abbreviations: F, female; M, male.

[a] After enrolling, Parent 6 opted not to complete the interview due to time constraints.

Table 3. Physical Therapists' Characteristics[a]

Physical Therapist	Sex	Age, y	Degree	Experience, y	Annual Anterior Cruciate Ligament Reconstruction Patients, No.
1	F	52	MPT	26	60
2	F	46	MPT	22	10
3	M	37	DPT	3	30
4	M	45	DPT	16	15
5	F	39	DPT	14	7
6	M	41	MPT	18	40
7	F	28	DPT	2	20
8	F	48	MPT	22	15
9	F	37	DPT	11	4

Abbreviations: DPT, doctor of physical therapy; F, female; M, male; MPT, master of physical therapy.

[a] Physical therapist 10 did not respond to emails and phone calls from the study team and was therefore excluded from the study.

Interpersonal Dynamics

Patients and parents indicated that interactions with the treating PT, treating surgeon, and friends or coaches had the potential to both positively and negatively affect their perceptions of the rehabilitation process. Patients and parents discussed the importance of a trusting and communicative relationship with their health care providers, whereas PTs commented that access to the parent and the treating surgeon was important in facilitating consistency in stakeholder knowledge and expectations for the rehabilitation process.

Communication Among Patients, Parents, and PTs. Inconsistency between the physician and PT was a source of frustration for patients, parents, and PTs. When communication and expectations were consistent, patients reported a better progression in their rehabilitation.

> I was kind of worried or nervous thinking that it [rehabilitation] would be really repetitive and take forever. I didn't know if I would ever really be able to play sports the same anymore, but they [orthopaedic surgeon] were communicating with my PT and everything; I felt better about it. (Patient 4)

Patients and PTs related that inconsistency was most problematic during the immediate postoperative period, and PTs observed that this was a persistent concern regarding functional milestones, such as return to running and sport-specific tasks like jumping or cutting.

> So that was very frustrating for me because my PT would be like, push harder, push harder, push harder, but then I'd go to my surgeon, and he would say something along the lines of, oh actually you can't start doing that. (Patient 2)

The PTs reported that perceived discrepancies between themselves and the surgeons regarding the speed of rehabilitation advancement due to lack of communication undermined health care decisions made by both providers.

> For instance, you know, my surgeons will say, well you can, you should be running right now. If they go back for a follow-up and the patient is like, well, I'm not running, so, so the patient is then confused because of the communication they have with their physician, and they think we're not doing a good enough job if indeed we're

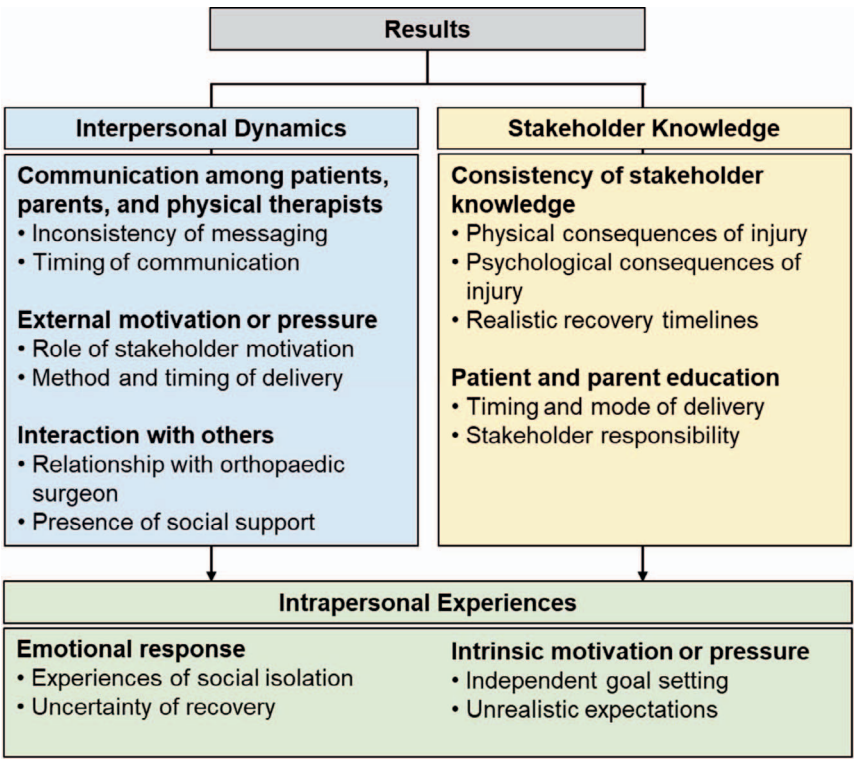

Figure. Depiction of the thematic structure resulting from our qualitative analysis involving all stakeholder groups.

not running the patient at that time. So that communication is very frustrating at our end. (PT 1)

External Patient Motivation or Pressure. Patients described mixed experiences with support from coaches or friends, depending on whether it was perceived as motivation or pressure. Parents and PTs consistently depicted their attempts as motivating and supportive. Patients and PTs agreed that external motivation was helpful for the patient in remaining disciplined.

> I do definitely feel as though I see better outcomes with parents who are willing to be involved. One, a lot of times there are restrictions: you know, no running for 3 months, no jumping, no cutting, and so I think if the parents are aware of restrictions, one, it helps prevent rates of re-tearing or any potential injury. Two, I also think when I can, if I give patients home exercises [and] if the parents are involved, I can also then educate the parents on how to look for good form or to make sure their child is doing exercise the right way. (PT 7)

However, some PTs perceived that if a parent attended too many rehabilitation sessions while holding unrealistic expectations for their child's recovery, that could be harmful.

> I think it depends on the anxiety level of the parent. High-anxiety parents, I try to push them more to the background because, some kids like to aggravate it more, some kids feed off of it and get anxious themselves, so with high-anxiety parents, I tend to push them to the background, and I'll be like, I'll update you at the end of the session. (PT 3)

However, this sentiment was not consistently expressed by the patients or parents interviewed in this study.

Interactions With Others. Patients and parents agreed that the quality of interactions with surgeons, rehabilitation-focused clinicians (ie, PTs), and nonmedical personnel such as teammates who had experienced an ACLR could either improve or complicate their understanding of the rehabilitation process. They also discussed the need for a central resource that contained the contact information of their health care professionals as well as a timeline or rationale for involvement of other health care providers, such as imaging or mental health services.

> It's not just about the surgery. I touched so many service lines. It is MRI [magnetic resonance imaging]. It is rehab. It is surgery. It is physicians. It's follow-up visits. It's additional ultrasounds. It's athletic trainers. I'm crossing to 5 to 6 to 7 different service lines. There should be a laid-out map plan or a multidisciplinary team or somebody that sits in there so you have a clear understanding of where you're going and what you need to do. (Parent 2)

Communication with the treating orthopaedic surgeon was particularly complex. All 3 stakeholder groups agreed that communication with the surgeon via email or a messaging application about complications, goal setting, and modifying restrictions would enhance confidence through a shared understanding of short-term and long-term expectations. In addition, patients reported that they valued interactions with teammates, coaches, or friends who provided comfort and support. As a result, several patients and parents indicated that access to a network of peers going through a similar rehabilitation experience would be helpful:

> I wish there was like a program, like, I don't want to relate it to an Alcoholics Anonymous-type program, but maybe something like that. Or even like a cancer program. That you just go and talk. (Patient 2)

Stakeholder Knowledge

Patient and parent knowledge was often inconsistent with the realities of the healing process and the protocol-based timelines put in place by the orthopaedic surgeons and PTs. The cause of such inconsistencies is multifactorial, but patients, parents, and PTs perceived a lack of patient and parent knowledge at the time of injury and a lack of high-quality educational resources developed specifically for adolescent patients as significant barriers to shared understanding among clinicians, patients, and parents.

Consistency of Stakeholder Knowledge. Patients and parents identified a postinjury assumption that rehabilitation would be easy due to the patient's age and prior level of athletic ability. Both patients and parents acknowledged that their lack of previous experience with orthopaedic injury and rehabilitation resulted in this false assumption.

> I think it comes down to not knowing, so I, you know, I never had an ACL[R] in my life, never had any so, so we didn't know really know what to ask. We just had that, um, you know, when he told us something and then we might, it might prompt us to ask a question. . .we, I kept asking what she can do, what can't she do, what she needs to do. That was a lot of those questions because we didn't know what to do. (Parent 1)

All 3 stakeholder groups acknowledged that the lack of patient and parent knowledge presurgery and immediately postsurgery was a challenge, and the magnitude of the challenge depended on the quality of the educational materials provided by the treating orthopaedic surgeon during clinical visits (see Supplemental Material, "Patient and Parent Education Subtheme Quotes").

> A lot of the information they provided me with was, you know, later after surgery. I felt really, I don't know, misguided in the beginning stages because they always tell you what you can't do, but they never tell you what you can do, so I felt like, every little thing that I was doing may have been wrong. (Patient 2)

This inconsistency in knowledge improved after engagement in the rehabilitation process due to regular access to a PT, yet patients and parents commented on highly variable experiences with patient education throughout the rehabilitation process. Specifically, patients described frustration with a lack of understanding regarding key time points during the rehabilitation process as well as the metrics that

would be used to evaluate whether adequate improvement had been made to allow for exercise progression or easing of functional restrictions.

> I think, the only thing that really affected my rehab was lack of communication because, um, one aspect, like I guess one sector of my rehab, they'd be like, oh yeah, you can definitely do this, and then another half would say, well not necessarily, and that would kind of put a sense of doubt in my head. (Patient 2)

Patients and parents were largely unaware of the mental toll that injury and rehabilitation would take on both parties. Many patients and parents indicated that the psychological challenges of the rehabilitation process were not stressed enough by their orthopaedic surgeon before surgery or their PT during the early phases of rehabilitation. Several patients and parents explained that clearer communication of the mental challenges commonly experienced by patients and access to a mental health referral network with expertise in the area of postoperative support would help alleviate these challenges.

> The only gap that I see in this whole process is there's no sports psychologist. Nobody tells you about the head game. (Parent 2)

This lack of knowledge was compounded by a lack of patient and parent understanding of rehabilitation timelines, which led to feelings of anxiety, frustration, and isolation.

> I think I stressed myself way more than I needed to be, and it probably would've helped if I had talked to someone about it. (Patient 5)

Patient and Parent Education. Patients and parents reported a lack of high-quality educational resources available to improve their understanding of the recovery process from the time of injury through the return to sport. This resulted in a dependence on the orthopaedic surgeon to describe the recovery process and occurred with varying degrees of success.

> The surgeon answered pretty much any question that we had. I guess, for me, the communication comes, since I've never had it done, didn't know anything, you don't necessarily know what questions to ask. I mean, the surgeon prompted us with anything that we would want, but there was still some, like, I don't know exactly what this means. And they kind of explained it, and there was some paperwork they handed us. So, there was a little uneasiness with that, not knowing what was going to happen to [my child]. (Parent 1)

The PTs agreed that clear communication and transparency from both the physician and PT would be helpful and educational materials or online resources specifically designed for patients and parents would be a tremendous benefit. In most cases, PTs noted that they relied on progress reports generated before clinical follow-up visits to the treating orthopaedic surgeon in the absence of better-quality educational materials.

> We do a progress note about the tenth, eighth to tenth visit, so the progress note indicated to them, yes, you're halfway there in strength or your range of motion is good now and your swelling is gone. So, at those progress notes throughout therapy is when they get feedback of how they're doing and progressing. (PT 1)

Intrapersonal Experiences

The most common intrapersonal experiences discussed by patients and parents were the emotional response to injury and the role of intrinsic motivation in the rehabilitation, both of which affected their interactions with clinicians involved in the rehabilitative process. Although this was not a primary focus of our study, it is important to note that patient and parent intrapersonal experiences provided context for understanding their perceptions and attitudes of interpersonal interactions and stakeholder knowledge during the recovery process. For example, in several cases, patients stated that a lack of preoperative or postoperative education about the psychological response to surgery and rehabilitation resulted in a lack of preparedness for negative emotional responses during rehabilitation:

> I feel like, physically I had enough information. I knew like, what was going to happen to my body, and what had happened to my body, but I feel like, mentally, I didn't have enough information. I was physically okay with the operation. And, obviously, my body has recovered nicely. But mentally, I don't think I was prepared. (Patient 2)

Consequently, patients reported that finding sources of intrinsic motivation, through independent or PT-facilitated goal setting, was helpful in sustaining their interest in and commitment to rehabilitation.

DISCUSSION

The primary purpose of our research was to examine the perceptions of information sharing and interpersonal communication among adolescent patients recovering from ACLR, parents of adolescent patients recovering from ACLR, and PTs who treated adolescents who were recovering from ACLR. We found that interpersonal dynamics and prior knowledge shaped intrapersonal experiences starting at the time of injury and extending through the end of rehabilitative care. Several groups have characterized patient or parent perceptions of the rehabilitative process after ACLR; however, this was the first study to incorporate the perceptions and lived experiences of PTs to provide important context from the health care team. Similar to the findings of several previous qualitative investigations that have focused on the experiences of the patient[5–7] or parent,[8] we demonstrated that patients and parents valued knowledge regarding the consequences of ACL injury and the timeline for recovery postsurgery. Consequently, patients and parents indicated that a lack of quality information from outside sources hindered their ability to gather and comprehend additional information from the PT and surgeon. Patients and parents described that this deficit in knowledge of the rehabilitation process resulted from a lack of experience along with limited access to educational resources or health care providers.

Consistent communication among health care professionals during the surgical and rehabilitative process is essential given that, in the United States, the treating surgeon and PT likely are not part of the same health care system. For example, only 1 of the 9 PTs (11.1%) practiced in a health care system directly associated with an orthopaedic surgery clinic that provided care to the patients included in this study. This may have resulted in a lack of immediate access to treatment documentation and limited informal interpersonal interaction during which a patient's progress or limitations could have been addressed. Uniquely captured here, PTs perceived the initial rehabilitation sessions to be an opportunity to fill in the gaps in patient knowledge about the rehabilitative process and review the surgeon's treatment protocols with the patient to facilitate a shared base of knowledge from which the collaborative relationship involving the patient, parent, and PT could develop. Although patients and parents identified PTs as very helpful in explaining the rehabilitation process and the expected timeline for recovery, PTs related the inconsistency in communication and expectations for progress between the PT and orthopaedic surgeon as a major challenge. Specifically, communication with the treating surgeon tended to occur during the week(s) preceding a patient's follow-up visits and, in many cases, communication of patient progress was limited to progress notes transmitted to the surgeon or a conversation with another health care professional (eg, physician assistant or athletic trainer [AT]) from the surgeon's practice. As a result, several patients, parents, and PTs felt there was a lack of shared understanding regarding early physical restrictions, the metrics used to evaluate progression, and estimated timelines for progression. When interpreting the findings of our study, it is also important to acknowledge that not all patients, parents, and PTs reported the same experience with the rehabilitation process. To facilitate understanding of the diversity of perceptions and beliefs described by those interviewed, we have included a supplemental document with quotes that can be sorted by role (ie, patient, parent, or PT), theme, and subtheme (see Supplemental Material).

Our samples of patients with ACLR (88.9%) and parents (77.8%) were primarily women (Tables 1 and 2), which is consistent with those of previous authors[5,8] who investigated perceptions of rehabilitation using qualitative methods. In addition, the PTs in this study had variable levels of experience (2 to 26 years of practice) and were responsible for the care of a wide range of patients with ACLR on an annual basis (Table 3). We did not focus on the roles of patient or parent gender or the PT's level of experience, yet both factors may have affected perceptions of positive and negative factors influencing the rehabilitative process as well as best practices for the treatment of patients with ACLR.[6,13] For example, recent qualitative work[6] highlighted that adolescent girls and boys both reported maintaining a motivational mindset throughout rehabilitation, but adolescent girls tended to value involvement with external support systems (eg, family or peers) more than adolescent boys. As a result, our findings might have been meaningfully different regarding perceptions of interpersonal dynamics among patients if our sample had been more balanced between adolescent boys and girls.

In addition to the primary purpose of our interviews (ie, development of a descriptive thematic structure), we also asked patients, parents, and PTs for tangible recommendations that would improve the rehabilitation process for themselves and other stakeholder groups. In this exploratory analysis, the most common recommendation was for patients and parents to be provided with regularly updated digital educational resources to improve their knowledge of the ACLR procedure, the rehabilitation timeline, and the resources available to them (eg, mental health support). Paterno et al[8] showed that patients and parents saw the PT as the guide through the rehabilitative process; patients and parents both thought it was challenging to ask informed questions at the preoperative and postoperative follow-up visits with the treating surgeon or during the initial PT visits due to their limited knowledge and the mixed messages they received from peers and existing online resources. Similarly, PTs indicated that overcoming these initial limitations in knowledge and supplementing the educational materials provided to patients by their treating surgeons was an important focus of the early rehabilitative process to ensure a shared understanding among patients, parents, and PTs. Furthermore, patients, parents, and PTs believed that the protocols would improve if specific timelines or metrics were used to progress a patient through the phases of rehabilitation (eg, return to running or return to sport). These additions may help reduce confusion or uncertainty about whether a patient is meeting expectations. As a result, we recommend that PTs proactively work with local surgeons to revise and update commonly used protocols to ensure that they include a sufficient level of detail and focus on the best current evidence in order to enhance consistency in the treatment approach by the health care team.

Our study was built on previous research[2] that suggested effective communication could positively influence a patient's recovery. Athletic trainers in the secondary school and university setting are uniquely positioned to facilitate communication and increase the frequency of patient education based on the nature of daily patient care often delivered in these environments. Along with serving in the role of communicator, ATs are well positioned to develop patient-specific educational materials that consider the characteristics and desires of the patient as well as the demands of the activity to which a patient hopes to return. Videos on popular social media websites were a primary educational resource for many patients recovering from ACLR, despite the fact that they tended to provide low-quality evidence about ACL injury and ACLR.[14] Thus, non–health care stakeholders could be consulting resources that were not evidence based and potentially harmful for an individual's recovery. In conjunction with local PTs and sports medicine surgeons, ATs should develop or identify high-quality, evidence-based resources to educate patients and parents about the injury, surgery, and recovery. Though every patient undergoes a different postsurgical experience, an overview of the generalized rehabilitation progression may be helpful in managing expectations and better informing patients and parents about the recovery. Finally, ATs should educate patients and parents about common psychological barriers experienced during rehabilitation, screen and monitor patients for poor psychological recovery through patient-reported outcomes, and communicate these findings to sports medicine surgeons for proper referral to a sport psychologist specialist, if necessary.

Limitations and Future Research

Several limitations should be considered when interpreting the results and conclusions of our investigation. Our sample was drawn from an ongoing prospective cohort study that involved patients from a local geographic region. This recruitment strategy may have resulted in a concentration of patients who had been treated by a limited number of orthopaedic surgeons or surgeons from a limited number of orthopaedic practices. Due to the sample size and the limited number of surgeon practices represented in the sample, we were not able to determine if themes varied among patients treated by different surgeons. As a result of this limitation, subsequent authors should attempt to characterize the effects of surgeon experience and communication style on patient perceptions of their care during rehabilitation. In addition, we focused this study on the lived experiences of adolescent patients with ACLR due to the complex nature of the relationships among patients, parents, and PTs that are inherent in this population. The perceptions of interpersonal interactions, intrapersonal experiences, and dynamics of knowledge transfer may be meaningfully different among independent, adult patients who do not have parental involvement in their surgical or rehabilitative process.

Also, orthopaedic surgeons were not interviewed for the current study; however, their relevance as important members of the medical team in the recovery process emerged strongly in the findings. Future researchers should include orthopaedic surgeons to gain a more comprehensive view of the interpersonal dynamics throughout a patient's recovery process.

CONCLUSIONS

Patients, parents, and PTs agreed that increased frequency of communication would help to ensure that patients were meeting progress expectations and that all members of the health care team had a shared understanding of the patient's needs. We recognize that these recommendations may be challenging to implement based on financial and logistical factors; nonetheless, any steps that will enhance patient or parent education and communication consistency among the health care team should be considered a step toward improving perceptions of the rehabilitation process after ACLR.

REFERENCES

1. Herzog MM, Marshall SW, Lund JL, Pate V, Mack CD, Spang JT. Incidence of anterior cruciate ligament reconstruction among adolescent females in the United States, 2002 through 2014. *JAMA Pediatr*. 2017;171(8):808–810. doi:10.1001/jamapediatrics.2017.0740
2. Armento A, Albright J, Gagliardi A, Daoud AK, Howell D, Mayer S. Patient expectations and perceived social support related to return to sport after anterior cruciate ligament reconstruction in adolescent athletes. *Phys Ther Sport*. 2021;47:72–77. doi:10.1016/j.ptsp.2020.10.011
3. Ardern CL, Taylor NF, Feller JA, Whitehead TS, Webster KE. Sports participation 2 years after anterior cruciate ligament reconstruction in athletes who had not returned to sport at 1 year: a prospective follow-up of physical function and psychological factors in 122 athletes. *Am J Sports Med*. 2015;43(4):848–856. doi:10.1177/0363546514563282
4. Truong LK, Mosewich AD, Holt CJ, Le CY, Miciak M, Whittaker JL. Psychological, social and contextual factors across recovery stages following a sport-related knee injury: a scoping review. *Br J Sports Med*. 2020;54(19):1149–1156. doi:10.1136/bjsports-2019-101206
5. DiSanti J, Lisee C, Erickson K, Bell D, Shingles M, Kuenze C. Perceptions of rehabilitation and return to sport among high school athletes with anterior cruciate ligament reconstruction: a qualitative research study. *J Orthop Sports Phys Ther*. 2018;48(12):951–959. doi:10.2519/jospt.2018.8277
6. Lisee CM, DiSanti JS, Chan M, et al. Gender differences in psychological responses to recovery after anterior cruciate ligament reconstruction before return to sport. *J Athl Train*. 2020;55(10):1098–1105. doi:10.4085/1062-6050-558.19
7. Burland JP, Toonstra J, Werner JL, Mattacola CG, Howell DM, Howard JS. Decision to return to sport after anterior cruciate ligament reconstruction, part I: a qualitative investigation of psychosocial factors. *J Athl Train*. 2018;53(5):452–463. doi:10.4085/1062-6050-313-16
8. Paterno MV, Schmitt LC, Thomas S, Duke N, Russo R, Quatman-Yates CC. Patient and parent perceptions of rehabilitation factors that influence outcomes after anterior cruciate ligament reconstruction and clearance to return to sport in adolescents and young adults. *J Orthop Sports Phys Ther*. 2019;49(8):576–583. doi:10.2519/jospt.2019.8608
9. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. 2007;19(6):349–357. doi:10.1093/intqhc/mzm042
10. Briggs KK, Lysholm J, Tegner Y, Rodkey WG, Kocher MS, Steadman JR. The reliability, validity, and responsiveness of the Lysholm score and Tegner activity scale for anterior cruciate ligament injuries of the knee: 25 years later. *Am J Sports Med*. 2009;37(5):890–897. doi:10.1177/0363546508330143
11. Patton MQ. *Qualitative Research and Evaluation Methods: Integrating Theory and Practice*. 4th ed. SAGE Publications; 2014.
12. Cooper H, Camic PM, Long DL, Panter AT, Rindskopf D, Sher KJ. *APA Handbook of Research Methods in Psychology, Vol. 3: Data Analysis and Research Publication*. American Psychological Association; 2012.
13. Greenberg EM, Greenberg ET, Albaugh J, Storey E, Ganley TJ. Rehabilitation practice patterns following anterior cruciate ligament reconstruction: a survey of physical therapists. *J Orthop Sports Phys Ther*. 2018;48(10):801–811. doi:10.2519/jospt.2018.8264
14. Springer B, Bechler U, Koller U, Windhager R, Waldstein W. Online videos provide poor information quality, reliability, and accuracy regarding rehabilitation and return to sport after anterior cruciate ligament reconstruction. *Arthroscopy*. 2020;36(12):3037–3047. doi:10.1016/j.arthro.2020.07.013

SUPPLEMENTAL MATERIAL

Supplemental Material. Semi-Structured Interview Guide and Patient and Parent Education Subtheme Quotes. Found at DOI: https://doi.org/10.4085/1062-6050-0491.21.S1

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