Journal of Athletic Training 2020;55(10):1098–1105
doi: 10.4085/1062-6050-558.19

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Gender Differences in Psychological Responses to Recovery After Anterior Cruciate Ligament Reconstruction Before Return to Sport

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Context: Female patients with anterior cruciate ligament reconstruction (ACLR) are less likely to return to sport than males. Psychological readiness predicts successful return to sport, but it is unclear if psychological experiences differ between males and females during recovery.

Objective: To explore gender differences in psychological readiness factors of return to sport after ACLR.

Design: Qualitative study.

Setting: Laboratory.

Patients or Other Participants: A total of 12 male (months since surgery = 6.2 ± 1.2) and 13 female (months since surgery = 6.4 ± 1.3) high school athletes with a history of ACLR.

Data Collection and Analysis: Participants were interviewed before physician clearance to return to activity. Transcribed interviews were analyzed using deductive thematic coding of 5 themes identified from previous research (psychological distress, self-efficacy, locus of control, athletic identity, and fear of reinjury) and inductive secondary subthematic coding. Gender comparisons were generated within primary themes and secondary subthemes.

Results: All deductive themes were consistently reinforced. Male and female participants reported fear of movement, loss of athletic identity, and motivational mindsets for return to sport and self-improvement. Males reported a stronger sense of internal locus of control using positive internal reinforcement, whereas females described balancing internal and external control and valuing external support systems. Male participants described mood changes influenced by physical and social limitations. Female participants closely monitored their emotions throughout recovery and were influenced by rehabilitation fluctuations.

Conclusions: Male and female high school athletes described different psychological factors related to return to sport and locus of control as well as psychological distress. Gender-specific psychological interventions may be warranted to overcome psychological barriers after ACLR.

Key Words: knee, athletic training, female athletes, rehabilitation

Key Points

- After anterior cruciate ligament reconstruction, male and female high school athletes reported similar psychological experiences reflecting fear of movement, loss of athletic identity, and self-improvement but differences based on locus of control and psychological distress.
- Clinicians should consider addressing psychological barriers after anterior cruciate ligament reconstruction using nuanced, gender-specific psychological interventions.

Gender differences are apparent in adolescents recovering from anterior cruciate ligament (ACL) reconstruction (ACLR). Females were 1.4 times less likely to return to their preinjury level of sport after ACLR than their male counterparts,[1] and 24% to 30% of young female athletes who did return to sport (RTS) went on to experience a second ACL injury within 2 years of ACLR.[2,3] These findings suggest a potential disconnect among the goals of the patient, the approach to rehabilitation, and the criteria used to evaluate readiness for RTS among young female athletes. Current recommendations[4,5] suggest that the evaluation of patient-reported psychological readiness for physical activity and sport (ie, no emotional disturbances, high self-efficacy, and little fear of reinjury) is a critical component of the clinical criteria used to clear individuals for safe reengagement in unrestricted physical activity after ACLR. This has most commonly been accomplished through patient-reported outcome measures (eg, Knee-Self Efficacy Scale and Athlete Fear Avoidance Questionnaire) that evaluate anxiety, confidence, fear of reinjury, and self-efficacy. The Anterior Cruciate Ligament Return to Sport After Injury (ACL-RSI)[6] and the Tampa Scale of Kinesiophobia-11 (TSK-11)[7] may be used to assess psychological readiness for RTS and fear of movement, respectively. Adequate psychological readiness and less fear of movement after ACLR have been linked to successful RTS within 1 year and a reduced risk of second ACL injury within 2 years after ACLR among young and active individuals.[5,7,8]

Although this knowledge is clinically important, Sims and Mulcahey[9] proposed a thematic structure to help health care professionals define and understand the meaningfully different psychological and social responses in psychological distress, self-efficacy, locus of control, fear of reinjury, and athletic identity of adult male and female patients recovering from ACLR. This thematic structure incorporates many of the concepts proposed by Wiese-Bjornstal et al,[10] who described a dynamic biopsychosocial model rooted in explaining how cognitive, emotional, and sociologic aspects interact to influence recovery from sport injury. Currently, adolescent male and female patients receive similar rehabilitative treatments and are evaluated using the same clinical criteria to gauge readiness for RTS despite the clear disparities in functional, psychological, and social outcomes after ACLR. More specifically, adult female patients have reported greater psychological distress, less self-efficacy, and greater internal locus of control after ACLR than male patients at similar points during rehabilitation.[9] We have limited knowledge about possible gender differences in psychosocial barriers and patient perceptions that may negatively affect adolescent athletes as they transition from structured clinical care to sport participation. Therefore, the primary purpose of this qualitative research study was to detect any gender-based differences present in the psychological response during the postoperative rehabilitation process before attempted RTS. Based on a review of findings of previous researchers,[9] we hypothesized that young female participants would report experiencing greater psychological distress, less self-efficacy, greater internal locus of control, greater fear of reinjury, and a weaker athletic identity than young male participants throughout rehabilitation after ACLR.

METHODS

This qualitative research study was designed in accordance with the Consolidated Criteria for Reporting Qualitative Studies (supplementary material).[11] The study was approved by the university's institutional review board, and written informed consent from each patient or guardian and assent from each minor patient was obtained before beginning the study.

Participants

Participants were referred from the university-affiliated sports medicine clinic by 3 orthopaedic surgeons. They were part of a larger ongoing study assessing clinical outcomes after ACLR and were referred between 4 and 12 months after ACLR based on the surgeon's discretion. This is an important transition period for patients, when they are often integrated into modified sport activity or are discharged from rehabilitation,[12] even though they may not be cleared for sport participation until 9 to 12 months after ACLR. Participants were included in the study if they were involved in high school athletics at the time of ACL injury, planned to RTS, had undergone subsequent ACLR, were able to walk without assistance, and had not been cleared by the orthopaedic surgeon for unrestricted RTS. Volunteers were excluded from the study if they had any unexpected surgical complications or were unable to take part in physical activity due to a previous medical condition. The first 25 patients from the larger study were asked over the phone or face to face to participate in the study, and all agreed to take part. They completed a single semistructured interview in the laboratory, with an average duration of 26 minutes (range, 19–38 minutes).

Data Collection

The interview guide was based on previous qualitative work[13] that examined the phenomenology of individuals after ACLR and literature[9] that explicitly detailed key gender-specific recovery differences after ACLR. The interview guide was designed to elicit both general and specific responses that would allow us to explore gender differences in psychological responses after ACLR. The full interview guide had been pilot tested, incorporated into a previous study's methods, and published.[13] A participant's parent or guardian was given the option to be present during data collection. A parent or guardian who opted to be present during the interview was encouraged to not take an active role in this process. One male (J.S.D.) and 1 female (C.M.L.) student-member of the research team conducted the interviews; C.M.L. accounted for 84% ($n = 21$) of the completed interviews. Several members of the research team (C.M.L., J.S.D., K.E., and C.M.K.) had studied qualitative methods extensively and published research in this domain, and members of the research team new to qualitative methods (M.C. and J.L.) underwent an extensive epistemologic and methodologic training protocol delivered by a member of the research team with expertise in this area (J.S.D.). Training consisted of review and discussion of introductory qualitative research content,[14,15] interview coding practice, and appraisal of coding with the expert research team members. Participants had no relationship with the research team members before the interview.

The interview process began with a brief overview of the study, followed by a rapport-building phase in which participants discussed their sport history, how their injury occurred, and their current state of recovery. Participants then identified barriers they had experienced throughout the rehabilitation process, and the interviewers asked probing questions to better understand and detail the characteristics of recovery that served as positive and negative factors in their psychological state. To implicitly isolate aspects of the participant's experience pertaining to gender, participants were asked to identify anything "about themselves as an individual" that may have shaped their perceptions and experiences throughout this process. Although the interview guide served as a tentative framework, the interviews were participant driven, and participants had the freedom to explore additional topics. The interview ended when the participant indicated that he or she had no additional information to contribute and confirmed the wish to conclude the interview. Each interview was audio recorded, with brief field notes taken by the interviewer in case of recording failure. A preliminary sample-size estimate ($n = 24$) was based on previous studies,[13,16] and general conceptual saturation was evaluated via consensus of the research team, at which point participant recruitment was halted.

After the semistructured interview, participants completed 3 patient-reported outcome measures to assess activity level, fear of movement, and psychological readiness

Table 1. Patient-Reported Outcomes of Male and Female High School Athletes

Outcome	Participants		*P* Value
	Males	Females	
Tegner Activity scale score[a]			
Preinjury	10 (9–10)	9 (7–10)	.01[c]
Current	7 (5–10)	7 (4–8)	.67
Anterior Cruciate Ligament Return to Sport after Injury Scale[b]	74.9 ± 19.7	77.6 ± 10.8	.66
Tampa Scale of Kinesiophobia 11 Short Form[b]	19.9 ± 4.4	19.6 ± 3.6	.85

[a] Reported as median (range).
[b] Reported as mean ± standard deviation.
[c] Significant difference ($P < .05$).

(Table 1). The Tegner Activity scale captures a participant's activity level before ACL injury and at the time of the interview.[17] Fear of movement and psychological readiness were evaluated using the 12-item ACL-RSI and the 11-item TSK-11 questionnaires.[6,18] The ACL-RSI is a valid and reliable questionnaire for individuals with a history of ACLR and is scored on a scale of 0 to 100 points[19]; a lower score indicates poorer psychological readiness for RTS. The TSK-11 has been validated in injured populations but not in individuals with a history of ACLR.[6,18] However, the TSK-11 has been used consistently in patients after surgery.[7,19] The TSK-11 is scored on a scale of 11 to 44 points, with higher scores indicating greater fear of movement. Participant demographics and gender differences in patient-reported outcomes were assessed with independent *t* tests.

Data Analysis and Credibility

After each interview, the accompanying audio file was transcribed verbatim by a research assistant in a blinded manner but was not returned to the participant for corrections or feedback. Within-interview participant-checking strategies (ie, continuous echoing and asking for correction and further information) were used to allow participants to correct researcher interpretations to aid in the validity and credibility of the results.[14] Additionally, 3 primary strategies were used to assist in data credibility and establish rigor: pilot testing, researcher triangulation, and data saturation.[14] Before the study protocol, we pilot tested the interview guide with a volunteer who had torn the ACL but who was excluded from the current sample because of nonoperative treatment. This piloting allowed us to examine the flow of the interview, gain feedback about the content and procedure of the interview guide, and practice conducting the interview before data collection with the target population. Next, during weekly meetings, 4 members of the research team (C.M.L., J.S.D., M.C., and J.L.) shared and compared their perspectives to identify key emerging themes in the data and ensure that each member of the team had a similar understanding of the coding process—both in terms of the operational definitions of the initial codes and the data analysis. Finally, these meetings allowed us to determine the point of data saturation, which occurred after 25 participants were interviewed.[14]

Additionally, as part of the researchers' approach to establish rigor and credible, trustworthy results, interview transcriptions were analyzed in a stepwise, 4-stage process: (1) deductive initial thematic coding, (2) inductive secondary subthematic coding, (3) gender comparisons of inductively derived emergent subthemes within each deductive primary theme, and (4) review and verification of the emerging thematic structure. Deductive initial thematic coding focused on 5 themes previously identified to meaningfully differ between genders (ie, psychological distress, self-efficacy, locus of control, fear of reinjury, and athletic identity). To further investigate the detailed, emergent subthematic structure within these higher-order themes, we completed in-depth line-by-line inductive coding of the transcriptions (blinded) to identify emergent lower-order themes nested within this larger framework. Lower-order themes were first identified irrespective of the participant's gender through an iterative process involving discussion and debate until conceptual consensus was achieved among 4 members of the research team (C.M.L., J.S.D., M.C., and J.L.). These themes were then consolidated for a clear, concise thematic narrative. The gender comparison involved examination of the coded participant transcripts by teams of 2 in an unblinded manner, with each team independently analyzing 1 of the gender-specific groups. Once conceptual consensus was reached within each gender-specific group, the 2 research teams met to identify key similarities and differences between the groups. First, each 2-person research team reviewed the opposite gender group's analysis notes, results, and illustrative examples to validate—and potentially challenge—the group-specific conclusions. Once these decisions were justified and consensus was achieved, the combined research team discussed key similarities and differences between the groups. Excerpts exemplifying the key themes and gender-specific comparisons were then identified.[4] Finally, to establish credibility by verifying the results of the emerging thematic structure, the coded transcripts and data-analysis notes were shared with 2 senior members of the research team who had not been involved in the data collection or analysis (K.E. and C.M.K.).

RESULTS

Participant characteristics, surgical information, and survey scores are reported in Tables 1 and 2.

Deductive Themes and Inductive Subthemes

All 5 overarching themes informed by Sims and Mulcahey[9] (psychological distress, self-efficacy, locus of control, fear of reinjury, and athletic identity) were present in the deductive initial coding of the thematic structure (Figure 1). Participants described mood changes, including anger, frustration, depression, and anxiety, related to the

Table 2. Participant Characteristics and Surgical Information

Outcome	Participants		*P* Value
	Males	Females	
Age, y[a]	16.2 ± 1.6 (13–18)	16.4 ± 1.3 (14–18)	.71
Height, m[a]	1.8 ± 0.1 (1.7–1.9)	1.7 ± 0.1 (1.6–1.9)	.01[c]
Weight, kg[a]	80.8 ± 23.9 (59.4–148.4)	74.9 ± 22.5 (54.9–138.9)	.54
Time between injury and surgery, d[a]	29.4 ± 13.1 (15–61)	27.3 ± 19.8 (5–74)	.79
Time since surgery, mo[a]	6.2 ± 1.2 (5.1–9.4)	6.4 ± 1.3 (5.0–10)	.77
Type of injury[b]			
Noncontact	58.3 (7)	61.5 (8)	
Contact	33.3 (4)	30.8 (4)	
Not reported	8.3 (1)	7.7 (1)	
Graft type[b]			
Bone-patellar tendon-bone	8.3 (1)	23.1 (3)	
Hamstrings tendon	75.0 (9)	76.9 (10)	
Allograft	16.7 (2)	0.0 (0)	
Sport[b]			
Baseball	8.3 (1)	0.0 (0)	
Basketball	25.0 (3)	76.9 (10)	
Cheerleading	0.0 (0)	7.7 (1)	
Football	58.3 (7)	0.0 (0)	
Soccer	8.3 (1)	0.0 (0)	
Swimming	0.0 (0)	7.7 (1)	
Volleyball	0.0 (0)	7.7 (1)	

[a] Reported as mean ± standard deviation (range).
[b] Reported as % (No.).
[c] Significant difference ($P < .05$).

nature of recovery process, which influenced their identity and involvement in everyday activities. In general, participants reported a motivated mindset related to return to physical activity and a strong athletic identity driving their overall self-worth. However, some individuals expressed a lack of motivation related to rehabilitation and engagement in social activities immediately after surgery. Most felt confident about activities of daily living and rehabilitation but lacked confidence regarding complex, sport-specific movements, such as cutting, which overlapped with subthemes related to fear of reinjury.

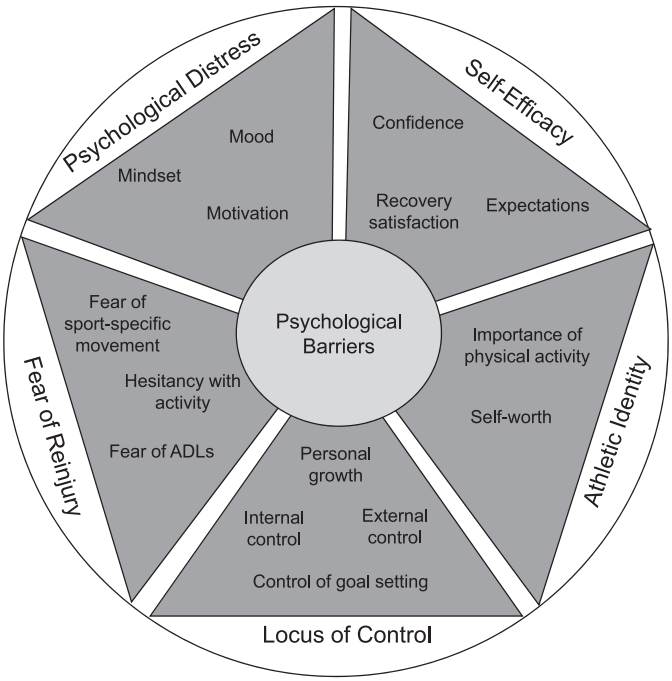

Figure 1. Primary subthemes that emerged from the thematic structure outlined by Sims and Mulcahey.[9] Abbreviation: ADLs, activities of daily living.

Greater satisfaction with recovery was related to perceived progress throughout rehabilitation and better access to resources, including braces, programs that help transition patients from rehabilitation to sport activity, and older athletes with similar injury histories who served as role models. Satisfaction with recovery was poorer when participants perceived their rehabilitation exercises as repetitive or compared their progress to either a previous personal injury or the recovery of peers from the same injury. Internal locus of control was driven by perceived experiences of overcoming adversity, self-improvement, and positive self-talk. External locus of control was related to the shaping of their recovery expectations by rehabilitation clinicians (ie, athletic trainers and physical therapists) and parents. Patients with control of goal setting had stronger feelings of self-determination and independence. However, they struggled when their goals were incongruent with the goals of rehabilitation clinicians or their parents. Participant 5 (male) stated:

> At first it was my parents. I didn't want to disappoint them because they want me to play football, and I was doing it for them mostly…And then I just realized that I don't want this to happen again. So, I just made a new goal saying I just want to get back to normal.

Gender-Specific Comparisons

Gender-specific patterns within the larger deductive themes are presented in Figure 2.

Psychological Distress. Male and female patients noted mood changes after surgery, especially frustration and

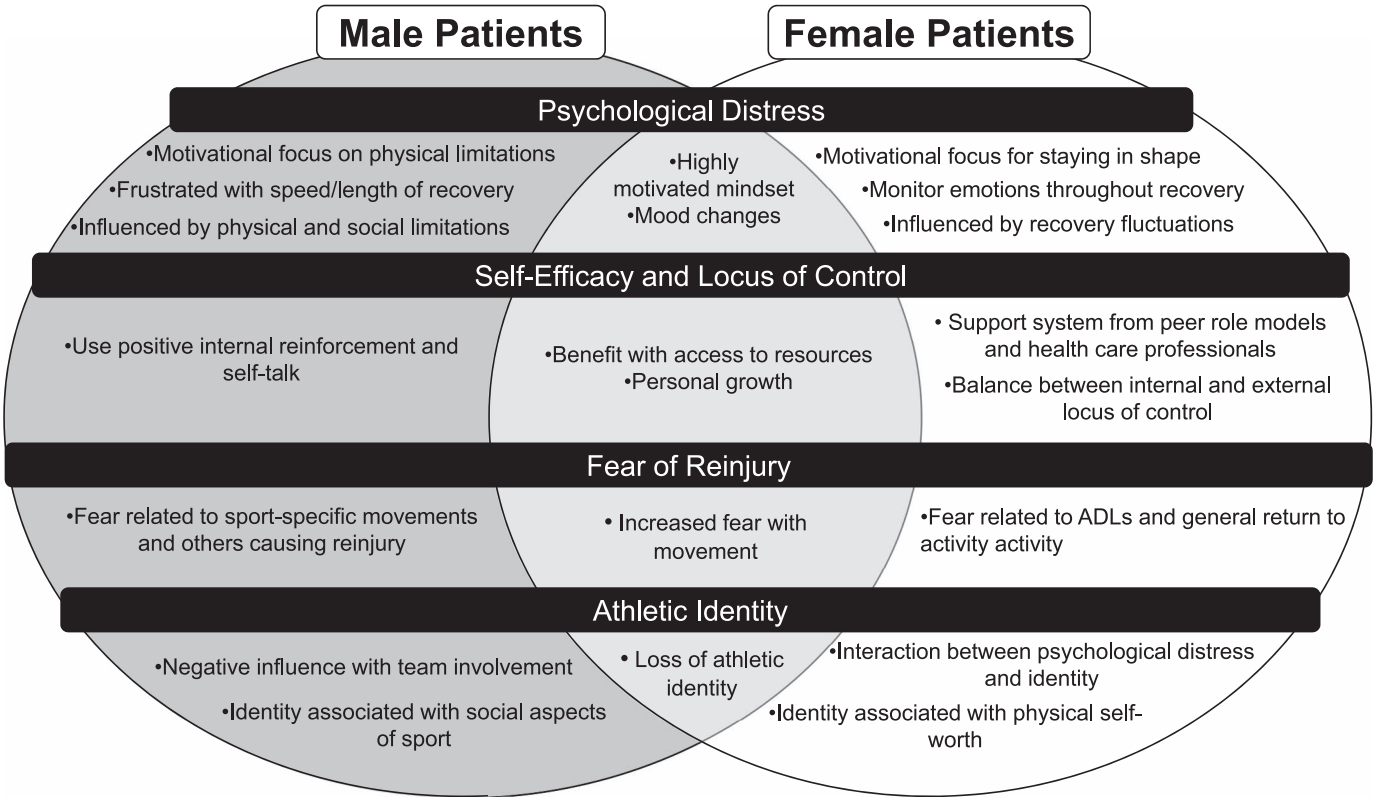

Figure 2. Gender-specific subthemes that emerged from the deductive thematic structure outlined by Sims and Mulcahey[9]; subthemes reported in the male and female sections of the Venn diagram represent differences in psychological responses between genders, and the overlapping section represents similarities.

sadness. Males described an identity shift and periods of isolation due to physical limitations and the inability to take part in social engagements throughout the recovery. Participant 1 (male) commented:

> It impacted me a lot because I wasn't able to do everything that I wanted to do and everything my friends were doing. So, it just made me, not less social, but less outgoing. I mean I'm not as talkative as I used to be.

Many male athletes expressed disappointment with the speed and length of the recovery process, but this theme did not emerge among females. Female athletes reported closely monitoring their emotions and motivations throughout the recovery process. They experienced greater day-to-day fluctuations in mood associated with improvements or setbacks in their recovery process. As participant 24 (female) remarked,

> I was just very down, but. . .as I went through the process, my spirits lifted up and I was like, 'oh it's all worth it, let's go, I'm going to go do this, I'm going to go run today, let's do this.' So. . . I was in the middle. . . Sometimes I'd be on the low side like I don't want to do it and sometimes I was on the high side, like I want to go work out.

Most individuals, regardless of gender, expressed a motivated mindset driven by long-term goals of returning to the same or higher levels of activity and achieving optimal physical performance after completing rehabilitation. However, short-term goals varied between male and female participants. Males were more apt to focus on their physical limitations, eg, smaller thigh muscles in the reconstructed limb than in the contralateral limb and limited lower extremity strength. Females tended to focus on limitations in physical fitness and described their motivation for staying in shape. Participant 25 (female) conveyed, "Because I'm kind of out of shape compared to what I used to be...I'm doing some basic weightlifting and stuff and I realized my cardio isn't as great as it used to be.

Self-Efficacy and Locus of Control

We report gender-specific results related to self-efficacy and locus of control concurrently due to their integrated nature. Many male and female participants described a strong internal locus of control. Males used internal positive reinforcement and self-talk to improve self-efficacy after rehabilitation.

> Because I want to push myself to get back and be better than I was. So if I want to get there, I need to keep pushing myself. This whole process has kind of taught me how to work through problems and push yourself to the limit with everything you do. (Participant 8 [male]).

Female participants described balancing internal and external influences of locus of control. This was paired with the tendency of females to emphasize positive support more strongly from peer role models and health care professionals, such as physicians, athletic trainers, and physical therapists. Participant 24 (female) observed,

> The rehab process, that was fun for me. I have worked with some great physical therapists and they help me out a lot. They motivated me and made it my pace but also pushed me to get to where I am now, so yeah, the rehab part was kind of fun actually.

Both male and female athletes approached their recovery experiences as opportunities to overcome adversity. Many described building skills to approach and conquer what they perceived as a challenge or problem in their lives. Like others, participant 1 (male) viewed this recovery process as a chance for physical and emotional self-improvement:

> I would just say don't think of it as a disadvantage, think of it as an obstacle you have to conquer. I mean, it's bound to happen to someone you know, so if it happens to you, just think of it as an opportunity rather than a challenge. It's a challenge that you have to conquer, but if you do it right, you'll be better for it.

Fear of Reinjury

Both male and female patients detailed feelings of fear related to movement and activity. Males emphasized fear with sport-specific movements, such as landing or cutting, whereas females highlighted fear with activities of daily living and general forms of physical activity. Male participants also reported fear of reinjury caused by other athletes, as indicated by participant 3 (male): "….I was worried [that] I would hurt it again. Especially with people screwing around, like in gym class and stuff. That was the only reason I was really worried about it."

Athletic Identity

All participants were actively engaged in sport before injury and recounted a long history of sport participation with a strong athletic identity. Females encountered a more noticeable daily disruption of their athletic identity that may have led to more intense mood shifts associated with psychological distress. Some male and female athletes continued to be involved with the team despite their inability to contribute physically. In general, females described this team engagement as a positive experience, whereas males were more likely to express negative experiences with continued team involvement. Participant 16 [female] commented,

> "For the first 2 months, I was still around my teammates everyday which helped, cause I mean coach kept me involved in drills like I could stand there and participate, kind of, which like gave me like motivation each day."

Participant 17 (male) found it challenging to remain involved:

> Basketball was hard cause all I did was sit there and kept books at the games, and track was hard cause of watching high jump. High jump is my passion, so watching that, it was hard and then… they had a new kid that jumped, and he beat my PR [personal record] at second jump that he did, so that was hard.

DISCUSSION

Psychological readiness is a key component of the RTS paradigm after ACLR. The lack of gender differences in our quantitative analysis of psychological readiness was consistent with the results of previous researchers[8] who observed that both male and female participants may encounter psychological barriers to RTS. However, specific psychological experiences may differ between male and female athletes, which should be considered in the approach to and implementation of interventions to improve psychological readiness after ACLR. All 5 deductive themes were present throughout the interviews, regardless of gender. Participants had a strong athletic identity, were motivated to RTS, and reported fear of reinjury in some capacity (Figure 1). Males were frustrated with physical limitations after surgery but described greater self-efficacy associated with a positive mindset (Figure 2). Females experienced periodic changes in psychological distress due to the highs and lows of daily progress and motivational benefits from social support. Our results suggested that high school–aged male and female patients recovering from ACLR underwent different psychological experiences after ACLR that potentially support the need for gender-specific interventions to overcome psychological barriers during rehabilitation (Table 3).

Although no consistent trends in cycles of psychological distress emerged, variable emotions, including anger, depression, anxiety, and frustration, were regularly described by participants. Previous investigators[20] found that individuals recovering from ACLR experienced depression to a greater extent than the national average. Among our participants, the frustration and anxiety experienced by males were rooted in physical limitations, indicating that performance reductions were a significant psychological threat to them after ACLR. Burland et al[21] recently proposed a model of learned helplessness in this population. The model explains the complex interactions among neurologic deficits, psychological distress, and their negative effects on biomechanical and muscular performance after ACLR.[21] Due to their focus on physical performance, males may be particularly vulnerable to learned helplessness. Incorporating learning goals as opposed to performance goals for male patients after ACLR may help deemphasize expectations related to the speed of recovery and achievement of optimal physical performance at certain time points during rehabilitation. Learning goals reward effort, deemphasize failure, and focus on task completion. Performance goals focus on how well the task is being completed and expose individuals to possible psychological distress upon failure.[22] For example, when a patient is returning to running, the clinician may first expose the individual to treadmill running without setting specific expectations, allowing him or her to "grow" into the activity and better understand how to judge the body's signals (learning goal). Once that has been achieved, the clinician may then progress the patient to more traditional performance metrics, such as distance, speed, or duration (performance goal). Goal setting is associated

Table 3. Gender-Based Recommendations Based on Psychological Responses Described by High School Athletes Recovering from Anterior Cruciate Ligament Reconstruction

Common Deductive Themes	Potential Intervention Strategies
Male patients	
Psychological distress	Incorporate learning goals to eliminate performance-reduction focus
Athletic identity	Diversify self-concept to promote self-improvement outside of athletic identity
Fear of reinjury	Graded-exposure rehabilitation; focus on sport-specific, high-risk movement patterns and contact with other athletes
Female patients	
Self-efficacy	Integrate positive reinforcement and self-talk, especially during periods of downward progress fluctuations
Locus of control	Promote social support with health care team and consistent team interaction, potentially in a modified role
Athletic identity	Diversify self-concept to promote self-improvement outside of athletic identity
Fear of reinjury	Graded-exposure rehabilitation; reintegration with general strength and condition and sport-related activity

with increased rehabilitation adherence,[23] and tailoring learning goals to male patients' preferences may help to scale self-judgment of physical performance, thereby improving their mindset during rehabilitation.

Greater self-efficacy is associated with improved patient-reported knee function, hop-test performance, and compliance during rehabilitation.[24–26] Therefore, self-efficacy is an important psychological determinant of success during recovery from ACLR. Earlier authors[9] demonstrated that male patients reported greater self-efficacy postoperatively than female patients. Interviews of our male and female participants supported this finding. Males in our study engaged in positive reflection and maintained a positive mindset, leading to increased confidence during rehabilitation, but this was not commonly discussed by females. Positive self-talk has been shown to improve self-efficacy and is associated with increased rehabilitation adherence.[23] Thus, female patients may benefit from interventions promoting and reinforcing positive self-talk in the rehabilitative environment. Positive self-talk to improve self-efficacy should be incorporated as early as possible in rehabilitation because preoperative self-efficacy is a predictor of better self-reported and physical function at 1 year after ACLR.[26]

Although many of our participants reported a strong internal locus of control, females described the need to balance between external and internal loci of control. Previous researchers[13] identified the benefits of support from health care professionals in promoting a positive recovery after ACLR, and this may be balanced with patient empowerment to encourage an internal locus of control. Patients who had trusting relationships with physicians and rehabilitation clinicians viewed these relationships as a positive factor in recovery, whereas a lack of attention from health care professionals was seen as a negative factor.[13] Health care professionals should intentionally incorporate in-clinic support of female patients specifically to promote external social support. Additionally, a novel finding in our study was the juxtaposition between male and female patients' perceptions of team social support. High school–aged female athletes recovering from ACLR may benefit from involvement with their sport team in a modified role to foster positive social support, but additional consideration is needed with male athletes, who may experience negative emotions from team interaction during recovery. This may be due to interpersonal comparisons with uninjured athletes[13] that lead to discouragement and greater psychological distress.

Male and female participants described fear of movement after ACLR. This result was supported by our quantitative analysis, which did not identify gender differences in TSK-11 scores. Of concern were the high average scores (>19) on the TSK-11 of high school athletes regardless of gender. A TSK-11 score of 19 at 4 months is associated with a high risk of secondary ACL injury.[7] This may reflect the relationships among high-risk landing mechanics, poorer psychological readiness, and greater fear of reinjury after ACLR.[19,27] Graded exposure interventions have proven successful in reducing fear of movement in patients with low back pain and may have implications for improving psychological wellbeing via functional activities after ACLR. Graded-exposure interventions identify tasks (ie, cutting or landing) or activities (ie, running or sport) that elicit fear and incrementally expose patients to tasks of increasing intensity to facilitate confronting fear with greater comfort.[28] For females, special consideration should be given to graded exposure to general physical activity participation, including, but not limited to, running, strength and conditioning, and sport activities. For males, graded exposure should focus on sport-specific, high-risk tasks such as cutting and landing or sport-related contact with other players.

Limitations of our study should be taken into account when interpreting the findings. A total of 21 interviews were conducted by a female interviewer, which may have affected the gender-based responses from male and female participants. Additionally, most patients in this study were minors and accompanied by their parents or guardians during the interviews, which may have caused them to unconsciously alter their responses. At the beginning of the interview, participants and their parents or guardians were instructed that the focus of the interview was on the participant and that only participant responses would be used in data analysis to help reduce external influences. The adolescent population was specifically chosen for this study due to a lack of research exploring psychological readiness after ACLR in this age group. Although this proved to be beneficial in creating a homogeneous sample and filling a gap in the literature, adolescents and adults reported different psychological experiences[29] after ACLR, suggesting that our recommendations are most beneficial for adolescents.

CONCLUSIONS

Male and female high school athletes with a history of ACLR did not demonstrate differences in patient-reported

outcomes of psychological readiness and fear of reinjury, but they did describe different psychological experiences during recovery. Males encountered psychological distress related to perceived poor physical performance and the slow speed of recovery. Females portrayed a greater external locus of control and more social support from health care providers and team involvement. Both male and female participants identified as athletes and developed a fear of reinjury. Nuanced gender-based psychological interventions may be beneficial for improving psychological readiness during recovery after ACLR.

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