

Psychological/Social Recovery after ACL

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Anterior cruciate ligament (ACL) rupture is a common injury in young athletes. To restore knee stability and function, patients often undergo ACL reconstruction (ACLR). In addition to restoration of functional strength and stability, psychological and social factors play an important role in the recovery and overall outcome of ACL injuries in the pediatric population. Factors such as psychological readiness to return-to-play (RTP), motivation, mood disturbance, locus of control, recovery expectations, fear of reinjury, and self-esteem are correlated to the RTP potential of the young athlete. A better understanding of these concepts may help to maximize young patients' outcomes after ACL reconstruction.

ACL injury

ACL reconstruction

psychological readiness

return to play

knee

1. Introduction

Psychosocial factors have been shown to affect the mental wellbeing of individuals and their ability to recover from injury ^{[1][2][3]}. Increased levels of stress and decreased social support are highly correlated with a decrease in both physical and mental health ^[4]. These factors have also been observed to serve as post-operative predictors for pain and negative patient reported outcomes ^{[5][6]}. The specific psychological factors that affect patients' RTS after ACLR include, but are not limited to, psychological readiness, fear of reinjury, and desire to return to sport.

Psychological readiness serves as a one of many predictors for an athlete's ability to RTS following surgical intervention. Psychological readiness is characterized by low levels of impediments including fear and anxiety and higher levels of dsuch as confidence, motivation, and realistic expectations ^{[7][8]}. Psychological readiness is measured using the ACL-Return to Sport After Injury (ACL-RSI) and the Injury-Psychological Readiness Return to Sport (I-PRRS) scales ^{[9][10][7]}. The ACL-RSI is a patient reported questionnaire that utilizes concepts of emotions, confidence, and risk appraisal to provide specific measurements of psychological readiness to RTS or pre-injury level of sport ^{[9][10][11]}. The I-PRRS scale tracks a patient's level of confidence at specific points during their rehabilitation ^[5], which is used to determine the patient's psychological readiness to RTS ^[12]. The I-PRRS scale allows for the evaluation of psychological readiness irrespective of the type of injury, while the ACL-RSI scale is used solely to assess psychological readiness of individuals recovering from ACLR ^{[7][11][12]}.

Fear of reinjury takes on the form of kinesiophobia ^[13]. Kinesiophobia is a construct within the fear-avoidance model that is defined as a state where an individual experiences excessive, irrational, and debilitating fear of physical movement and activity as a result of a feeling of susceptible to painful injury or reinjury ^{[14][15][16]}. The Tampa Scale of Kinesiophobia (TSK-11) is used to measure levels of pain-related fear of activity or re-injury in

patients recovering from ACLR or other forms of surgical intervention, with higher scores being indicative of higher levels of fear [\[17\]](#)[\[18\]](#)[\[19\]](#).

Desire to return to sport or motivation stems from obtaining external/internal rewards and maintaining a positive self-concept [\[20\]](#). Motivation holds a basis in autonomy or actions based on one's interests and values and these interests compel individuals to comply with what will allow them to best achieve these interests and goals [\[21\]](#). The assessment of motivation or the desire to RTS usually takes the form of interviews utilizing open-ended questions that provide researchers with a sense of a patient's thoughts and experiences relating to their injury and rehabilitation [\[22\]](#).

1.1. Psychological Readiness

One of the predictors of successful return to play of the athlete and regaining a pre-injury level of functioning is the display of psychological readiness [\[23\]](#)[\[9\]](#)[\[10\]](#)[\[24\]](#). In other words, the athlete should develop a more positive mindset regarding his or her injury, and regarding the idea of returning to play. Using the ACL-RSI scale to evaluate psychological readiness, Ardern et al. found that a one point increase in ACL-RSI scale score (higher psychological readiness) equates to approximately twice the odds of returning to the preinjury activity [\[9\]](#).

Gender also appears to be related to psychological readiness to RTS in patients recovering from ACLR [\[25\]](#)[\[26\]](#). Utilizing the ACL-RSI scale to assess psychological readiness Webster et al. found that males reported higher levels of psychological readiness than females, with 30% of male athletes returning to preinjury level of sport as compared to 17% of their female counterparts. From the ACL-RSI scale, female patients were seen to score lower on psychological readiness and exhibit an increased negative outlook on their injury [\[25\]](#).

1.2. Fear of Reinjury

As many as 24%–35% of athletes who injure their ACL can suffer from subsequent fear of reinjuring, hindering their return to sport or to their preinjury level of sport [\[27\]](#)[\[9\]](#)[\[10\]](#)[\[18\]](#)[\[19\]](#)[\[28\]](#). Through patient interviews, Ross et al. found long post-operative recovery time and restricted function to be associated with the formation of fear of reinjury [\[29\]](#).

1.3. Desire to Return to Sport

Athletes who desire to return to sport appear to be more likely to do so. Competitive athletes returned to sport within 12 months significantly more than recreational athletes, due to perceived increased time investment in the sport, leading to increased motivation to return [\[23\]](#). Those who exhibit higher levels of motivation are seen to comply with and complete their rehabilitation program, allowing for safer and quicker RTS and to preinjury level of sport [\[23\]](#)[\[22\]](#)[\[28\]](#).

2. Reinjury

Psychological factors have been linked to reinjury after successful return to sport. One-third of young athletes who undergo primary ACLR will rupture their graft or injure the contralateral ACL within two years following ACLR [30]. The incidence of a second ACL injury in young athletes (mean age, 17.2 ± 2.6 years) within 24 months of ACLR and RTS was six times greater than that of a young athlete with no history of ACL injury [31]. Interestingly, Webster et al. found that greater psychological readiness in younger patients correlated with a higher risk of a second ACL injury [32]. As such, the effects of these psychological factors do not simply end following RTS and continue playing a role in the likelihood of reinjury in those who RTS following ACLR. The Tampa Scale of Kinesiophobia (TSK-11) is a test that assesses pain-related fear of movement/reinjury. Individuals with TSK-11 scores higher than 19 at the point of RTS were 13 times more likely to suffer a second, ipsilateral ACL tear within 24 months following RTS [33]. Even following RTS, psychological and physical factors must be taken into account and steps must be taken in order to ensure that these factors do not allow subsequent ACL injuries to arise.

3. Treatment and Interventions

Proposed treatment focuses on postoperative psychological rehabilitation based on preoperative psychological assessment aimed at recognizing positive or negative psychological responses to injury. Evaluation of high versus low self-esteem, high versus low self-efficacy, optimism versus pessimism, and confidence versus anxiety can be a first step in treatments aimed at modifying harmful attitudes. Psychological rehabilitation is deemed necessary due to the inherent difference in timeline that exists between reaching physical readiness versus psychological readiness [7][34][35]. Psychological rehabilitation focuses on those who are more susceptible to the negative effects of the psychological factors of ACLR rehabilitation and RTS [7]. Hsu et al. hypothesized that addressing the psychological factors that have been previously identified such as fear of reinjury would assist patients in their RTS and preinjury level of sport [14]. Moving away from the fear of reinjury, interventions could also focus on addressing the desire or motivation to return to sport. Interestingly, since motivational factors such as perceived financial benefit from RTS appear to be positively correlated to RTS and return to preinjury level of sport [36], psychological rehabilitation that focuses on identifying the motivational factors to RTS or encourages the development of motivational factors could result in accelerated, successful RTS and to preinjury level of sport. Preoperative psychological assessments could be used to identify a lack of motivational factors prior to ACLR, which then allows doctors to attempt to help the patients pinpoint motivational factors that would assist the patient in their rehabilitation and successful RTS.

4. Recommendations

The current recommended interventions include psychological rehabilitation in addition to physical rehabilitation to facilitate successful RTS and return to preinjury level of sport [14][7][34][35]. Psychological rehabilitation addresses the psychological factors that have been previously discussed (psychological readiness, fear of reinjury, and desire to return) to assist patients in their successful RTS. Two randomized control trials from New Zealand examine the effectiveness of a modeling video and imagery, respectively to reduce preoperative perceptions of anxiety and pain as well as improve functional outcomes [37][38]. In both studies the study group experienced less anxiety and knee

function as measured by the IKDC system and knee laxity. Current literature lacks detailed experimentation surrounding the specific outcomes of psychological rehabilitation; however, current research documents their hypothesized benefits in allowing for safe, successful RTS.

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