

HOW DOES A COMPLETE ACL RECONSTRUCTION SURGERY CAUSED BY A  
SPORTS-RELATED INJURY CREATE PSYCHOLOGICAL TRAUMA IN COLLEGIATE  
STUDENT-ATHLETES: AN INTAKE ON MUSCLE GUARDING

by

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**Abstract**

An anterior cruciate ligament (ACL) reconstruction due to a sports-related injury can cause psychological factors such as muscle guarding. The inability to perform pre-ACL injury can correspond to an athlete experiencing learned helplessness (LH). LH can be described as a sense of self-doubt, lack of confidence, and fear of re-tearing this specific knee ligament. The methodology used for this research was a survey questionnaire that consisted of 18 questions which were administered by SurveyMonkey. The results indicate that 23 participants, or former and current collegiate student-athletes, had little to no prior knowledge of muscle guarding and its effect on sports performance. The significance of these findings corresponds to the lack of mental health readiness in return-to-sport (RTS) protocols, especially for invasive injuries that require surgery.

### **Dedication**

To all former and current athletes:

I dedicate my research and findings to *all* athletes that have never felt heard. As a former player and collegiate athlete, I hear you. I am listening to the struggles you have felt, the hopelessness that you have experienced, and the mourning of letting go of your former self--your former athlete.

### **Acknowledgement**

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To my partner, Hank, I thank you for encouraging me to listen to my younger self and to reflect on the sports-related injuries I endured. In order to do so, I had to accept the psychological trauma that occurred and appreciate the outcome of putting my mental health first.

**Glossary of Abbreviations**

<b>Abbreviation</b>	<b>Full Term</b>
<i>ACL</i>	Anterior cruciate ligament
<i>LH</i>	Learned helplessness
<i>RTS</i>	Return-to-Sport (protocol)
<i>SRTS</i>	Successful return to sport

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## **Chapter I: Introduction**

The purpose of this research thesis is to collect data via survey questions to determine if current and former collegiate student-athletes fall under the spectrum of suffering a complete anterior cruciate ligament (ACL) tear that requires surgery to fix. The survey will also include a section that determines if individuals prior to beginning college understood the severity of this injury, the prevalence of this injury, and the mental toll it could take. The survey questions are created on SurveyMonkey and are presented via social media platforms: Linked In, Twitter, Facebook, Instagram, Elizabeth City State University student GroupMe, and Email. The specific target audience is current and former collegiate student-athletes.

### **1.1 Statement of Purpose**

This thesis is intended to describe the psychological struggles that concur with a complete ACL reconstruction surgery due to a sports-related injury. The aim is to express the prevalence of mental health issues this specific knee injury can cause. Since the recovery from an ACL reconstruction requires invasive surgery and an intensive rehabilitation process, the intent is to discuss the concept of muscle guarding and how the brain prevents [recovered] collegiate student-athletes from reaching their full performance prior to their injury.

**Research Question: How does a complete ACL reconstruction surgery due to a sports-related injury cause psychological trauma to collegiate student-athletes?**

### **1.2 Problem Statement**

The prevalence of anterior cruciate ligament (ACL) tears in collegiate student-athletes have created a negative stigma, or fear, of playing at an advanced level. With this type of invasive knee injury requiring a complete reconstruction of the ACL, it has been categorized as having a major impact on both the physical and mental states of student-athletes. The return to sport protocol (RTS) by orthopedic surgeons has been debated on prolonging the rehabilitation process due to the invasiveness of the surgery, the weakening of the [surgery] leg muscles (quadricep fatigue), and the mental hindrance caused by muscle guarding.

The problem that can occur with the rehabilitation process can leave student-athletes with a fearful mindset when returning to their sport due to the traumatic experience their body has endured. The significance of an ACL reconstruction process for athletes can range from six to nine months, but the majority require a rehabilitation process that [should] exceed this timeframe. Whether the type of care an athlete receives ends in a positive or negative outcome, outside factors that can inhibit their recovery process. These factors can be enforced due to the type of care they choose; their athletic departments aids (i.e., athletic trainers, sports doctor, etc.); or their ability to afford treatment. With the stigma of an ACL reconstruction surgery already negatively impacting student-athletes' mindsets prior to starting college, this type of rehabilitation care is unfathomable when dealing with this common knee injury. Something that should be included in the RTS protocol is the psychological readiness for a successful return to sport (SRTS). In this case, surgeons should reevaluate post-surgery protocols and consider a delay in RTS timeline to go beyond the standard 9 month post-surgery mark. These important factors could potentially decrease the re-rupture rate, and decrease muscle guarding. (Kaplan, Y., & Winvrouw, E. 2019)



## **Chapter II: Review of Literature**

Anterior cruciate ligament (ACL) reconstruction surgery is an arduous process that requires a significant amount of mental and physical commitment based on the individual's rehabilitation guidelines. Orthopedic research has been focused on optimizing the success rate of ACL reconstruction surgery based on enhancing surgical techniques. It is essential to understand that the success rate of this invasive knee surgery is co-dependent on how well the individual, or athlete in this case, performs during their rehabilitation. When dealing with student-athletes, or athletes from different ages and levels of competitiveness, psychological factors are associated with the patient's perceptions and functional outcomes. With the surgeons guidelines and protocols, these procedures (i.e., exercises, treatment, etc.) do not include sports related factors and influences. Ideally, towards the end of recovery, most student-athletes are primarily focused on their return-to-sports (RTS) protocol to involve their sports-related movements and motions. A section based on the mental or psychological components of ACL rehabilitation should be implemented in the RTS protocol for this invasive sports-related injury. Many athletes are faced with issues related to "...emotional disturbance, motivation, self-esteem, locus of control, and self-efficacy can have profound effects on patients' compliance, athletic identity, and readiness to return to sport." (Christino, 2015) A critical role in the functional outcomes for each athlete that is faced with ACL reconstruction surgery is influenced by the psychological aspects that are expected to be overcome with an achievable mindset of returning to their sport with full readiness and preparedness.

As stated, the primary orthopedic research is to optimize the technical aspects of ACL reconstruction but this may be a hindrance due to increasing RTS outcome by disregarding the readiness for the individual's specific sport. With the ACL reconstruction surgery being both a

physically and mentally demanding rehabilitation process, the psychological effects can seem unnoticed by the athletes yet this factor decreases the return rate. As reported, 66% of athletes had not returned to their competitive sport by 12 months after their surgery. This percentage resulted in 44% of these athletes fearing re-injury as their primary reason for not reentering the competitive sport. (Christino, 2015)

Even though it is a critical component to rehabilitation success, the psychological function is often overlooked in ACL injuries; and as a result, can influence modifiable factors. As listed, "...these factors include a fear of re-injury (avoiding certain behaviors or movements due to perceived fear) and kinesiophobia (debilitating fear of physical movement or activity resulting from a feeling of vulnerability due to painful injury or re-injury)." (Burland, J. P., Lepley, A. S., DiStefano, L. J., & Lepley, L. K., (2019, September 26) These factors can create cognitive barriers that inhibit the success rate of rehabilitation outcomes in ACL patients, and the reintegration into their specific sport(s). Additionally, the broader examination of psychological conditions reflect an interconnection between distress and neural activity; and this psychological behavior, or mental barrier for athletes, is known as learned helplessness (LH).

LH is known as a psychological paradigm in response to traumatic injury, neural alterations, and uncontrollable situations; and can manifest clinically as impaired motor patterns, reduced motivation and psychological deficits. The learned helplessness is "...based on a theoretical model of uncontrollability (experiences or injuries that foster a perceived lack of control) that occurs following neurological impairments, where individuals believe that their ability to achieve a specific task is not within their control." (Burland, J. P., Lepley, A. S., DiStefano, L. J., & Lepley, L. K. (2019, September 26) This can contribute to athletes experiencing neural impairments that involve motor deficits due to the interaction between

psychological function; negatively influenced individual performance; and the establishment of a psychological response of avoidance of a task that causes distress. In response to an athlete experiencing learned helplessness from their ACL recovery, this is a coefficient in the brain creating a psychological barrier that was previously referred to as: muscle guarding.

### **Chapter III: Methodology**

The methodology performed during this research experiment is conducted through a survey questionnaire based on ACL and knee injury prevalence; ACL rehabilitation knowledge and outcomes; and if the current or former collegiate student-athlete experienced an ACL injury while performing. The survey will consist of psychological and health-related questions based on the participants personal experience with their ACL rehabilitation process. Additional questions will relate to ACL anatomy and injury prevalence (in sports).

#### **3.1 Introduction of Survey**

The purpose of this experiment is to evaluate the knowledge and significance of an ACL reconstruction injury and surgery via a survey questionnaire. These questions will be asked in a format that can explain the prevalence of ACL or knee injuries amongst collegiate student-athletes. In addition, the data collected will begin to analyze the significance of this invasive surgery; and prompt a revision-based discussion for the return-to-sport (RTS) protocol for ACL injuries. Most importantly, this survey aims to bring awareness to the prevalence of mental health issues in sports-related injuries, and how this can negatively impact athletes.

Following the explanation of the critical factors, this survey will be conducted for the targeted audience: former and current collegiate student-athletes who experienced an ACL

injury. These series of questions involve the knowledge of what an ACL is; the rehabilitation and recovery protocols; and if the student-athlete experienced an ACL injury that required reconstruction. Additional questions will be asked about: the rehabilitation process (i.e. negative or positive experience), and their mental state throughout their entire recovery alongside their confidence once returning to their sport(s).

The aim of this experiment is to imply as well as improve the mental factors that play a role in the recovery process for athletes. This could begin the extensive research behind the prevalence of mental illness that is solemnly reflected in ACL or knee injuries. If there is a great significance amongst the mental illnesses that arise from ACL injuries, then there is a possibility that the RTS protocol needs to require psychological clearance upon a final release.

### **3.2 Table of Survey Questions**

The survey questions used for this research were modified from two ACL readiness surveys by Team ACL and OrthoToolKit. By combining these two surveys, with the modification of terminology, they are able to contribute to the purpose of muscle guarding insight pre-and post-surgery, as well as confidence levels for each participant. By administering this survey in sections, it enhances the participants' understanding of the importance of ACL reconstruction on a personal level due to psychological factors. The sections of the survey are as follows: Prior to ACL Injury, ACL Recovery Process, and ACL Readiness and RTS questionnaire.

Provided down below in *Table 3.2* are the modified survey questions used for distribution on SurveyMonkey to gather the research for this data collection:

*Table 3.2:  
Modified Survey Questions used on SurveyMonkey*

Category	Survey Questions
Prior to ACL Injury	<ol style="list-style-type: none"> <li>1. Are you 18 years old or older?</li> <li>2. Do you know what an anterior cruciate ligament (ACL) is?</li> <li>3. Do you know where an anterior cruciate ligament (ACL) is located?</li> <li>4. Were you afraid of enduring an injury by playing your sport?</li> <li>5. Were you afraid of injuring your knee by playing your sport?</li> <li>6. Do thoughts of having to possibly endure surgery and rehabilitation prevent you from playing your sport to your fullest potential?</li> </ol>
ACL Recovery Process	<ol style="list-style-type: none"> <li>1. Were you informed about the potential psychological factors of an anterior cruciate ligament (ACL) recovery process?</li> <li>2. Do you know what muscle guarding is?</li> <li>3. Were you informed of muscle guarding?</li> <li>4. Were you informed of the possibility of re-rupturing or re-tearing your anterior cruciate ligament (ACL)?</li> </ol>
ACL Readiness and RTS questionnaire	<ol style="list-style-type: none"> <li>1. Are you confident that your knee will not give way by playing your sport?</li> <li>2. Are you confident that you could play your sport without concern for your knee?</li> <li>3. Are you confident that your knee will handle the demand of your sport?</li> <li>4. Do you find it frustrating to have to consider your knee with respect to your sport?</li> <li>5. Are you fearful of re-rupturing your knee while playing your sport?</li> <li>6. Are you confident your knee can hold up under pressure?</li> <li>7. Did you experience negative thoughts about returning?</li> <li>8. Did you experience a sense of the inability to play to your full potential?</li> </ol>

## **Chapter IV: Results**

The results of the data collection reflect the overall understanding of the anterior cruciate ligament (ACL) anatomy; the recovery process of each participant; and how their knowledge of muscle guarding is a reflection of their [potential] learned helplessness. This survey consisted of 18 questions about ACL knowledge prior to the athletes' injury, the athletes' recovery process, and the athletes' personal perspective on their return-to-sport readiness. The purpose of this data collection was to gather responses that correlate to the potential muscle guarding experience that could have influenced learned helplessness through a decrease in athletic abilities and confidence level in their [surgery] knee(s).

### **4.1 Survey Results Description**

Listed in section 4.2 *Graphs of Survey Results* provides the (6) six questions that reflect on the knowledge of muscle guarding, and each participants' confidence level in correlation to their knee recovery and sports performance. The data obtained is a series of "yes or no" questions that pertain to the athletes' ACL recovery process, their intake on muscle guarding, and the outcome of confidence levels based on their preparation for their sport. All participation remains voluntary, and all participants remain anonymous.

### **4.2 Graphs of Survey Results**

**Note:** Section 4.2 *Graphs of Survey Results* is separated into two parts: Part 1 and Part 2.

As followed: Part 1: Analysis of Data Collection for Questions 7 to 9

Part 2: Analysis of Data Collection for Questions 16 to 18

*Part 1:* Certain questions reflect the desired purpose of the data collection in the means of muscle guarding and ones' confidence in their ability to return to their sport successfully.

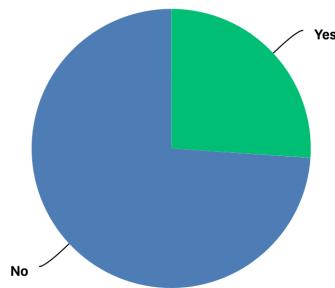
Provided below in *Part 1* are (3) three questions that correlate to the psychological awareness of an ACL reconstruction that entails a vigorous rehabilitation process of (9) nine months or more.

**Part 1: Analysis of Data Collection for Questions 7 to 9  
(Psychological Factors & Muscle Guarding)**

*4.21 Graph Question 7 Data Results*

**Q7** Were you informed about the potential psychological factors of an anterior cruciate ligament (ACL) recovery process?

Answered: 23 Skipped: 0

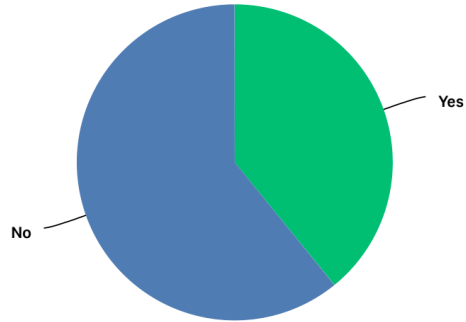


ANSWER CHOICES	RESPONSES	
Yes	26.09%	6
No	73.91%	17
TOTAL		23

4.22 Graph of Question 8 Data Results

Q8 Do you know what muscle guarding is?

Answered: 23 Skipped: 0

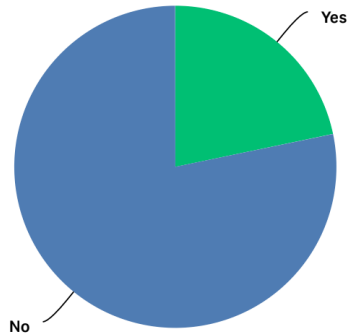


ANSWER CHOICES	RESPONSES	
Yes	39.13%	9
No	60.87%	14
TOTAL		23

4.23 Graph of Question 9 Data Results

Q9 Were you informed of muscle guarding?

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	21.74%	5
No	78.26%	18
TOTAL		23



*Part 2:* The responses from the 23 participants provide a clear description on if these individuals were informed by their surgeon of the psychological factors of muscle guarding in relation to ACL reconstruction. In *Part 2* these (3) three questions correlate to the confidence levels the 23 participants have in correlation to their knee trust, or knee functioning, and their sports performance. This is in retrospect of potential negative thoughts about returning and an inability to play to their fullest potential.

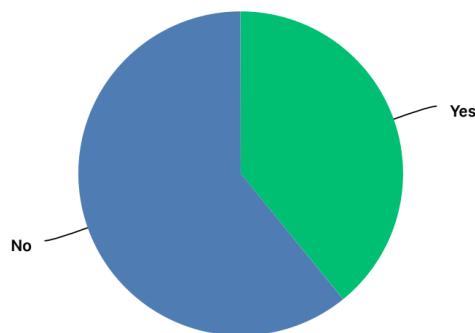
**Part 2: Analysis of Data Collection for Questions 16 to 18**

**(Confidence in Knee & Sports Performance)**

*4.24 Graph of Question 16 Data Results*

Q16 Are you confident your knee can hold up under pressure?

Answered: 23 Skipped: 0

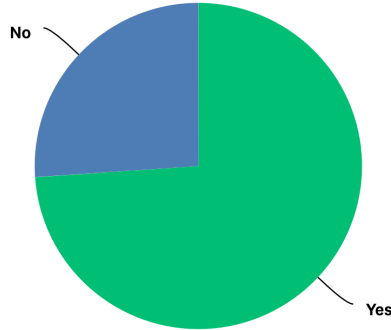


ANSWER CHOICES	RESPONSES	
Yes	39.13%	9
No	60.87%	14
TOTAL		23

4.25 Graph of Question 17 Data Results

Q17 Did you experience negative thoughts about returning?

Answered: 23 Skipped: 0

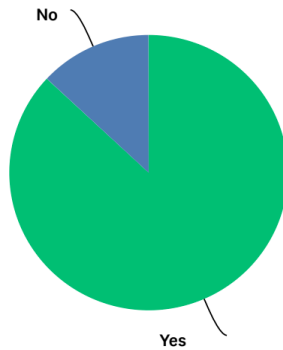


ANSWER CHOICES	RESPONSES	
Yes	73.91%	17
No	26.09%	6
TOTAL		23

4.26 Graph of Question 18 Data Results

Q18 Did you experience a sense of the inability to play to your full potential?

Answered: 23 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	86.96%	20
No	13.04%	3
TOTAL		23

## **Chapter V: Discussion**

The discussion provides an overview of the (6) six questions acquired from the survey questionnaire. The analysis of the data collection describes the familiarity of muscle guarding prior to ACL reconstruction; and the effects of the strenuous recovery process that can influence a sense of learned helplessness and the inability to perform athletically.

### **5.1 Analysis**

As the survey data collection reflects the (6) six desired questions about muscle guarding and the emotional hindrance of sports-related performance, also known as learned helplessness, this provides insight into the psychological factors of ACL reconstruction. Since this type of surgery is invasive to the knee due to the ramification of the [natural] knee function pre-ACL reconstruction, this can influence psychological hindrances upon returning to play. The survey questions 7 to 9 observe the awareness of what muscle guarding is in correlation to the surgeon, physical therapist, or athletic trainers' involvement in educating patients. The survey questions 16 to 18 observe the confidence levels and negative connotation that can occur in athletes upon ACL recovery. Both parts in the results analyze how these 23 athletes responded to their ACL injury, their thought process during recovery, and how assured they felt in their knee post-rehabilitation. As reflected, the majority of the participants experienced a sense of decreased confidence levels upon release, and had no prior knowledge of muscle guarding or its effect on sports performance.

## **5.2 Recommendations**

The recommendation for muscle guarding awareness and the sign(s) of learned helplessness in athletes can be directly approached by advocating for mental health involvement during the return-to-sport protocol. By discussing with athletes enduring an ACL reconstruction, they can begin to understand other hindrances beyond physical, such as the psychological factors. It is highly advised that mental health as a whole should be discussed thoroughly and constantly to allow for normalization of the topic. The discussion of mental health is especially important amongst athletes that have any sports-related injury that can cause a setback in performance levels. In order to begin this discussion, the return-to-sports protocol must be revised by administering a mental health section. The addition of a mental health section can be further enhanced with continuous revision that implements a specific screening based on injury level. This can bring awareness to the potential facts of muscle guarding and decrease the amount of learned helplessness that can occur in athletes; primarily for collegiate athletes performing at this high level of competitiveness.

## **5.3 Conclusion**

In conclusion, an athletes' recovery process exceeds a physical level and can be hindered by psychological factors such as muscle guarding and learned helplessness. Each return-to-sport protocol for invasive injuries and surgeries, like ACL reconstruction, should initiate a mental health screening prior to the release of participation and sports performance. By bringing awareness to these psychological hindrances, there is a possibility that this can increase the success rate of return-to-sports protocols while also advocating the importance of mental health recognition and treatment(s) for athletes. In doing so, there is the possibility of decreasing the

[potential] effects of muscle guarding and learned helplessness that athletes can endure during a sports-related injury.

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