Examining Collegiate Athletes' Psychological Resilience to Their Rehabilitation Belief, Effectiveness and Adherence Processes

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Abstract

Injury is a commonly experienced competitive stressor collegiate athletes encounter in their athletic careers. many athletes are able to overcome their injury by following a rehabilitation program prescribed to them by either their athletic trainer, doctor, or physical therapist, but the effectiveness of their rehab can be variable. Psychological resilience may be one factor that is positively associated with athletes' optimal recovery from injury. The purpose of this study was to examine the relationship between collegiate athletes' perceptions of their resilience after sustaining a significant injury to their rehabilitation beliefs, rehabilitation adherence, and rehabilitation effectiveness. Collegiate athletes (N= 63; 37 females & 24 males; M_{age} = 21 years) who had undergone an injury (in the previous two years) that prevented their participation in their sport for a minimum of three weeks completed the Connor-Davidson Resilience Scale (CD-RISC; 2003), the Sports Injury Rehabilitation Beliefs Survey (SIRBS; Taylor & May, 1996), the Rehabilitation Adherence Survey (Sanni & Fry, 2019), and the Rehabilitation Effectiveness Survey (Sanni & Fry, 2019). Bivariate correlations revealed a positive and significant relationship between resilience and athletes' beliefs about their successful ability to rehab (treatment and self-efficacy, and susceptibility) as well as their perceptions of the overall effectiveness of their rehab programs. The findings highlight the key role that resilience may play in helping athletes maximize their recovery from injury.

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Introduction

Psychological resilience is receiving growing attention in the sport psychology literature (Galli & Gonzalez, 2014). Researchers are striving to understand why some individuals are able to thrive under pressure and overcome adversities they face in life, and more specifically, their athletic pursuits. Fletcher and Sarkar (2012) defined psychological resilience as "the role of mental processes and behaviors in promoting personal assets and protecting an individual from the potential negative effect of stressors" (p.675). Essentially, resilience occurs when athletes adapt well to, or bounce back from trauma, tragedy, threats, and external stressors (American Psychological Association [APA], n.d.) that may impede overall performance. Athletes commonly experience adversity during their athletic careers. Researchers have been examining collegiate and professional athletes' perceptions of and experiences with resilience and have found that resilient athletes possess numerous psychological factors that protect them from negative effects of stressors (Fletcher & Sarkar, 2012). One area within sports that resilience has been examined is with athletes recovering from injury, although research is limited in this area. Thus, the purpose of this study was to examine how athletes' resilience predicts their beliefs, adherence, and effectiveness with regard to rehabbing from injury.

Fletcher & Sarkar (2012) developed a model describing the link between psychological resilience to optimal sport performance. They maintained that resilience occurs when sport performers positively evaluate stressors. The researchers created their model after conducting a study with Olympic champions, who were asked to identify stressors they experienced during their sporting careers. The athletes' identified three major types of stressors (i.e., competitive, organizational, and personal) as well as five psychological factors (i.e., positive personality, motivation, confidence, perceived social support, and focus). In essence, all athletes experience

stressors but the extent that athletes can display positive psychological factors should lead them to have facilitative responses which in turn will be more likely to result in optimal sport performance.

Fletcher et al. (2006) defined organizational stressors as those directly associated with individuals' work environment. Competition overload, travel arrangements, nutritional issues, leadership styles, lack of social support, and inadequate communication styles are examples of organizational stressors. Tabei, Fletcher, and Goodger (2012) found that athletes who experienced greater organizational stressors also reported greater burnout.

Personal stressors occur when athletes experience heightened demands related to life events that are outside of the direct sport environment (Sarkar & Fletcher, 2014). Death of a family member (Mckay et al., 2008), loss of a team member (Scanlan et al., 1991), in addition to balancing academic commitments, educational goals, athletic goals, and personal relationships (Mckay et al., 2008) are examples of the personal stressors encountered during athletes' sporting careers. Experiencing personal stressors can be very taxing for athletes. Albinson and Petrie (2003) found a significant relationship between athletes' perception of negative life events with greater postinjury mood disturbance immediately after injury occurred.

In addition to organizational and personal stressors, there are competitive stressors that athletes experience that are directly related to competitive sport performance (Mellalieu, Hanton, & Fletcher, 2006). Sarkar and Fletcher (2014) identified preparation, pressure, underperforming, high expectations, and rivalry as examples of competitive stressors. It's noteworthy that the researchers also included injury as a frequent competitive stressor. Injury-related stressors include the risk of sustaining an injury, getting injured, inability to train, missing competitions,

and loss of physical fitness (Evans, Wadey, Hanton, & Mitchell, 2012). These injury related stressors have been found to negatively affect recovery outcomes (Evans et al., 2012).

While stressors can be detrimental to athletes' performances, some athletes are able to have positive psychological responses to such stressors and still perform well. Sarkar and Fletcher (2014) identified five psychological factors that play a key role in athletes' display of resilience. The first identified protective psychological factor is positive personality. These are continuing patterns of thoughts, behaviors, and feelings that reflect how individuals respond to various situations (Roberts, 2009). Positive personality includes adaptive perfectionism which is having high personal standards and diminutive concern for mistakes and doubts (Stoeber & Otto, 2006); being hopeful, which has been associated with higher academic and athletic success (Curry et al., 1997); being competitively driven, which has been found to lower anxiety (Jones & Swain, 1992); being optimistic, resulting in lower levels of pre-competition anxiety (Wilson et al., 2002) and having a task-oriented coping style post performance slump (Grove & Heard, 1997). Lastly, positive personality includes a proactive personality. Fletcher and Sarkar (2012) found that a proactive personality is an important attribute when dealing with pressure associated with sport at higher levels because it influences athletes' responses to adversity in a positive manner.

Motivation is the second psychological factor. Sarkar and Fletcher (2014) expressed the importance of obtaining optimal motivation because it improves psychological resilience for sport performers. Pelletier et al. (2001) reported that competitive swimmers who felt they had control over the decisions they make (i.e. autonomous motivation) in their sport also reported higher effort, interest, and persistence.

The third psychological factor is confidence. Galli and Vealey (2008) identified confidence as a positive influence for withstanding pressure and stress in competitive settings. High self-confidence has been linked with proper preparation, self-awareness, visualization, and experience while also impacting athletes' reactions and responses to potential negative effects of stressors (Sarkar & Fletcher, 2014). More specifically, Hays and her colleagues (2009) found that high self-confidence facilitated performance through positive thoughts (e.g. enjoyment), effective cognitions (e.g. focus on tasks), effective behaviors (e.g. confident body language), and positive feelings.

The fourth psychological factor is focus. Focus occurs when individuals employ purposeful mental effort to what is most important to them during any situations (Moran, 1996). Sarkar and Fletcher (2012) identified focus as an important aspect of resilience in higher level sport performers because it has a positive influence on their cognitive processes while they are under pressure. Researchers have found that attentional focus (e.g., focusing on task relevant cues) helps athletes to adapt to setbacks while they effectively move to excellence in their sporting careers (e.g., Holland, Woodcock, Cumming, & Duda, 2010).

Lastly, perceived social support plays a key element in how athletes overcome stressors. Sport performers' access to social support (e.g. friend, coaches, teammates, family) are relevant to their success because it acts as a stress buffer (Sarkar & Fletcher, 2014). Rees and Hardy (2000) interviewed high-level athletes to obtain more understanding of how social support relates to performance. The researchers found four primary dimensions of social support. Emotional support occurs when athletes are being comforted, loved, cared for, and receive a sense of security. Esteem support refers to when others are bolstering a person's sense of competence or self-esteem. Informational support happens when others provide advice and guidance, and lastly

tangible support occurs when others provide concrete instructional assistance. Rees and Hardy (2000) found these dimensions of social support (e.g., received support) are linked to athletes' psychological well-being resulting in the perceptions of enhanced performance.

Sarkar and Fletcher (2014) indicated that athletes who developed these strong psychological factors are more likely to overcome their stressors and display facilitative responses likely to result in optimal sport performance. The model seems particularly relevant and appropriate to use when considering athletes who have sustained injury and are trying to rehab effectively. In a study employing Fletcher and Sarkar's (2012) grounded theory of psychological resilience, Codonhato et al. (2018) examined the relationship between injured Brazilian rhythmic gymnasts' stress and resilience. They found support for all components of the model, indicating that resilience plays a key role in the process of injury rehabilitation and stress control for these elite athletes.

Injury within sports has been a growing topic in the sport psychology literature due to its alarming reported cases each year. When participating in sports, it is common for athletes to experience unavoidable challenges that result in severe injuries especially at the elite levels because the pressure to win is greater. This is vital to understand because serious injuries can affect athletes' emotional wellbeing, psychological wellbeing, and a chance for a successful career, in addition to the physical challenges they face. Wiese-Bjornstal et al. (1998) have found that shock, anxiety, anger, depression, and feelings of helplessness are frequent psychological and emotional behaviors prevalent during athletes' injury onset while frustration, jealousy, guilt, relief, and apathy behaviors are typical responses during rehabilitation.

Clearly, the challenges that serious injuries present can go beyond the physical aspect of rehabilitation. Some athletes refuse to give up sports because it is how they self-identify

themselves due to years of investment and success they have accumulated throughout their career. However, the level of functioning for them to compete at an elite level post-injury may be diminished due to the psychological constraints or ineffective rehabilitation process. While returning to sport participation, athletes may also experience feelings of re-injury anxiety, impatience, excitement, and various levels of confidence (cf. Evans & Hardy, 2002; Podlog & Eklund, 2006). The ability to recover rapidly when injured is important to any athletes' success within their sport but dealing with the injury is a personal experience. The healing process varies for athletes because some athletes may have developed the mental strength or willingness to concentrate on overcoming their injury while other athletes' mental strength may be inadequate to recover effectively. For example, Tracey (2003) investigated collegiate athletes' emotional responses to injury during their rehabilitation process and found that athletes who had recovered in the past used their knowledge of what to expect to help them retain a positive focus during their current rehabilitation process. Researchers (Connor-Davidson, 2003; Galli and Vealey, 2008; Sarkar & Fletcher, 2012, 2013, 2014; Galli & Gonzalez, 2017) are gaining insight into how resilience aids athletes in coming back from injury.

In summary, it appears that psychological resilience may heighten the effectiveness of athletes' rehabilitation process because it helps athletes strive for and accomplish their goals. When injured athletes possess the attributes within the resilience framework during their rehabilitation process, they are apt to create a positive experience for themselves despite the difficulties they face and in turn increase their chances of recovering more quickly and effectively.

Rehabilitation Beliefs. One outcome variable that may be particularly important when considering the relationship between resilience and recovery from injury is athletes'

rehabilitation beliefs. Taylor and May (1996) identified five areas of rehabilitation beliefs that are key to athletes' effective recovery from injury. These beliefs include the following (a) athletes' beliefs that they can fully recover from injury without susceptibility to reinjury; (b) their beliefs regarding the severity of the injury; (c) their self-efficacy in terms of adhering to the rehabilitation program; (d) their efficacy that the treatment program is strong and will lead to complete recovery; and (e) their evaluation of the value of completing the rehabilitation program. Lu and Hsu (2013) found that higher social support and two types of hope (i.e., positive personality) predicted injured collegiate student-athletes rehabilitation beliefs, rehabilitation behavior, and subjective well-being. It would appear that athletes' strong psychological resilience would be linked to their rehabilitation beliefs although there is limited research that has investigated this connection.

Rehabilitation Adherence. Another important outcome variable during the injury recovery process, is rehabilitation adherence. Although adherence has been defined in different ways across studies, definitions typically include some aspects of attendance, engagement, and in general following the prescribed program (Meichenbaum & Turk, 1987). Often researchers describe adherence in terms of the athletes' attendance at appointments, actively participating in their rehabilitation sessions, avoiding harmful activities that could cause setbacks, wearing protective devices (e.g. brace, recovery boots, crotches), and carrying out rehabilitation exercises at home or during seasonal breaks. Research has found that athletes who adhered to their rehabilitation programs were more self-motivated, perceived that they worked harder, were not bothered by scheduling of sessions and environmental conditions, and tolerated pain better (Fisher et al., 1988). Further, research has supported that adherence improves rehabilitation

outcomes (Brewer et al., 1994a; Pizzari, Taylor, McBurney, & Feller, 2005). It may well be the case that athletes' psychological resilience is positively associated with rehabilitation adherence.

Rehabilitation Effectiveness. The third important outcome variable is athletes' perceptions of the effectiveness of their rehabilitation program. Athletes can vary greatly in their assessment of how effective their rehabilitation program is. Athletes who perceive their rehabilitation program was effective may have proceeded more quickly through the rehabilitation program than is typical for their injury. Further, athletes who rehabbed effectively may feel strong and heathy as they return back to the full sport training routine and feel that they were on track with their athletic career. To date, research has been limited in considering athletes' perceptions of the effectiveness of their sport rehab after sport injury. It follows that athletes who reported greater psychological resilience might in turn perceive that their rehab program was more effective.

Study Purpose

In summary, it is important to consider the role resilience plays in fostering athletes' optimal recover from injury. Currently, research has provided some evidence to support the relationship between athletes' sport resilience to their perceived and objective experiences rehabbing from injury, although research is limited on this front. Therefore, the purpose of this study was to examine the relationship between collegiate athletes' perceptions of their resilience after sustaining a significant injury (within the previous two years) to their a) rehabilitation beliefs, b) rehabilitation adherence, and c) rehabilitation effectiveness. Resilience is hypothesized to account for a significant portion of the variance for each outcome variable.

Method

Participants

Participants were (N=63) collegiate athletes from all divisions NCAA, NAIA, or NJCAA sports programs. Participants (18-25 yrs.; male and females) met the following selected criteria: (a) participated in competitive sports from a collegiate program, (b) had a major injury in the past two years that hindered their participation in their sport for a minimum of three weeks, and (c) received physical therapy (rehabilitation) or surgery after the injury. The participants came from various racial/ethnic backgrounds, from different universities and/or colleges and represented a variety of team and individual sports.

Measures

Demographics. A questionnaire was distributed to obtain demographic and injury/rehabilitation related information about the participants. The questionnaire included items requesting athletes' age, gender, if they endured a major injury that hindered their participation in their sport teams for a minimum of three weeks, and if they have undergone reconstructive surgery, or if they took part in physical therapy/ rehabilitation program as part of their recovery phase.

Resilience. The Connor-Davidson Resilience Scale (CD-RISC; 2003) is a brief self-rated assessment to help quantify resilience qualities. The measure includes 25 items rated on a 5-point scale ranging from 0 (not true at all) to 4 (true nearly all the time). Scores were calculated by taking the average across the items, and higher scores reflect higher resilience. For the purpose of this study, student athletes were asked to reflect on a period when they were rehabbing from an injury. Specifically, the stem for each item will be, "During the period I was rehabbing from my injury…" Sample items include "I had a strong sense of purpose" and "I was not easily discouraged by failure."

The scale has demonstrated adequate psychometric properties with regard to internal consistency (0.72-0.89) and test-retest reliability (Connor & Davidson, 2003; Olmo Extremera et al., 2017). A preliminary study on the psychometric properties of the CD-RISC in a general population and with clinical psychological patients supported its internal consistency, reliability and convergent and divergent validity (Connor & Davidson, 2003). Extremera, Moreno, Gonzalez, Ortega & Ruz (2017), indicated that the instrument is "can be extrapolated to any combination of subjects with the field of sports" (p. 99).

Rehabilitation. The Sports Injury Rehabilitation Beliefs Survey (SIRBS; Taylor & May, 1996) measures injured athletes' beliefs about rehabilitation. For the purpose of this study, student athletes were asked to reflect on a period where they were rehabbing from an injury. The measure includes 19 items rated on a 7-point scale ranging from 1 (very strongly disagree) to 7 (very strongly agree) with mean scores calculated in five scales: Susceptibility (sample item: The way to prevent my injury from worsening was to follow my rehabilitation program.); severity (sample item: I feared that this injury would affect my long-term sports involvement); self-efficacy (sample item: I believed that I would stick with my rehabilitation program despite any difficulties I encountered); treatment efficacy (sample item: Completion of my rehabilitation program would guarantee that I recover from my injury); and Rehabilitation value (sample item: Fully recovered from injury was extremely important to me). For the purposes of this study, two items were removed from the susceptibility scale because the wording could not be adapted to be appropriate for the retrospective nature of the study. The susceptibility scale, then included three items. Taylor and May (1996) provided support for the psychometric features of the SIRBS.

Rehabilitation Adherence. A three-item measure assessing athletes' perceptions of their rehabilitation adherence was developed for the purposes of this study. The items included the

following: During my rehab from my injury, … "I followed my athletic trainer's/doctor's direction completely," "I attended all my rehab sessions," and "I completed all exercises assigned to me (outside of rehab sessions)." Athletes responded to the items using a 7-point scale, ranging from 1(very strongly disagree) to 7(very strongly agree). Scores were calculated by taking the average across the three items.

Rehabilitation Effectiveness. A four-item measure assessing athletes' perceptions of their rehabilitation effectiveness was also developed for the purpose of this study. These items include the following: "I rehabbed more quickly than is typical for athletes with my injury," "I felt strong and physically healthy," I felt ready to transition into a full training routine," and "I felt like I was back on track with my athletic career." Athletes responded to the items using a 7-point scale, ranging from 1(very strongly disagree) to 7(very strongly agree). Scores were calculated by taking the average across the four items.

Procedure

Following approval from the researcher's institutional review board (IRB), participants' recruitment via email and data collection began. Participants were recruited through coaches, via posted fliers around the athletic department, and via the Sport Psychology Listserv. A standardized email was distributed to collegiate coaches explaining the purpose of the study and requesting their collegiate athletes be invited to participate by completing the survey. Prior to questionaries' administration, collegiate athletes read through an information statement and were informed about the anonymous nature of the study. Participants were then asked to complete the following questionnaires: The Connor-Davidson Resilience Scale (CD-RISC; 2003), The Sports Injury Rehabilitation Beliefs Survey (SIRBS; Taylor & May, 1996), The Rehabilitation

Adherence Scale (Sanni & Fry, 2019), and the Rehabilitation Effectiveness Scale (Sanni & Fry, 2019). The study took approximately 10 minutes to complete.

Data Analysis

Results of several a couple different analyses are presented in the following section. Once data collection was completed, the data was analyzed using IBM SPSS Statistics 25. First, the descriptive statistics for each measure was computed. Second, Bivariate correlations amongst resilience to each of the three outcome variables were examined to determine the relationships and assess reliability.

Results

Descriptive Statistics

The descriptive statistics for all of the variables are shown in Table 1. Cronbach alpha reliability coefficients for resilience and the scales of the rehabilitation belief survey were all acceptable (.73-.87). Overall, athletes reported a strong sense of resiliency about their rehabilitation program.

The correlations among the variables were computed and presented in Table 2. Resilience was positively and significantly correlated to three of the rehabilitation beliefs scales (i.e., susceptibility, self-efficacy, and treatment-efficacy). In addition, there was a positive and significant correlation between resilience and rehabilitation effectiveness.

Table 1
Descriptive Statistics for Resilience, Rehabilitation Beliefs, Rehabilitation Adherence, and Rehabilitation Effectiveness

Measure	α	Mean	SD	Minimum	Maximum
Resilience (25)	.85	2.88	.45	1.68	3.76
Rehabilitation Belief					
Susceptibility (3)	.84	5.76	1.10	2.67	7.00
Severity (5)	.73	5.33	.74	3.60	7.00

Self-efficacy (4)	.82	5.60	1.00	3.0	7.00
Treatment-efficacy (4)	.87	4.92	1.30	1.75	7.00
Rehabilitation Value (1)		6.52	.84	4.00	7.00
Rehabilitation Adherence (3)	.85	5.86	1.08	2.67	7.00
Rehabilitation Effectiveness (4)	.76	4.45	1.16	1.75	7.00

Note: For each scale, the number of items is displayed in parentheses. Possible score ranges are 0-4 for resilience, and 1-7 for Rehabilitation Belief, Rehabilitation Adherence, and Rehabilitation Effectiveness.

Table 2
Bivariate Correlations of Relationships Among Variables

Variable	Resilience	Treatment-efficacy	Self-efficacy	Severity	Susceptibility	Rehab value	Adherence	Effectiveness
Resilience	1.0							
Treatment-efficacy	.41**	1.00						
Self-efficacy	.41**	.55**	1.00					
Severity	-.04	.08	.25*	1.00				
Susceptibility	.41**	.64**	.49**	.29*	1.00			
Rehab value	.16	.25*	.56**	.32*	.31*	1.00		
Adherence	.14	.30*	.55**	.21	.34*	.51**	1.00	
Effectiveness	.30*	.56**	.20	-.12	.24	-.10	.14	1.00

Note: **p < .01, two-tailed; *p <.05, two-tailed. Rehabilitation Beliefs (Treatment-efficacy, Self-efficacy, Severity, Susceptibility, Rehabilitation value), Adherence = Rehabilitation Adherence, Effectiveness = Rehabilitation Effectiveness.

Discussion

The purpose of this study was to examine the relationship between collegiate athletes' perceptions of their resilience after sustaining a significant injury (within the previous two years) to their a) rehabilitation beliefs, b) rehabilitation adherence, and c) rehabilitation effectiveness. Results provide partial support for the hypotheses. Specifically, resilience was positively associated with three of the five rehabilitation beliefs scales as well as athletes' perceptions that their rehabilitation program was effective.

With regard to the positive relationship between resilience and rehabilitation beliefs, athletes who rated resiliency as higher were also more likely to believe that the treatment outlined by their health professional (i.e., athletic trainer, physical therapist, physician) was strong and precisely outlined what they needed to do at the time to have a full recovery (Taylor & May, 1996; Galli & Vealey, 2008). Perhaps resiliency helps athletes adopt a positive perspective about their recovery from setbacks such as injury.

As expected, resiliency was also positively associated with athletes' beliefs that they personally had the capability (self-efficacy) to do everything necessarily to complete their rehab program. It follows that feeling a strong sense of being able to overcome adversity, as experienced during serious injury, might lead athletes to feel that they have the ability needed to go the distance in their rehab program and fully recover from their injury. Athletes' efficacy in the rehab process is key to a successful rehab recovery (Brewer, Cornelius, & Van Raalte, 2003).

Finally, with regard to the athletes' beliefs about their rehabilitation processes, athletes' resilience was associated with their perceptions that they were less susceptible to reinjury in the future after their recovery. Previous research has identified the fear of reinjury as a prominent stressor for athletes (Evans, Wade Hanton, & Mitchell, 2012; Sarkar & Fletcher, 2013, 2014), so feeling less susceptible to injury is an important outcome in the rehabilitation process.

In addition to athletes' resilience being linked to their personal self-efficacy, their treatment-efficacy, and their susceptibility to reinjury, resilience was also positively associated with athletes' perceptions that their overall rehabilitation process was effective in helping them fully return to their sport participation. Taylor and May (1996) have identified athletes' beliefs in their treatment efficacy as an important variable in their complete healing. Further, Fisher et al., (1988) found that athletes who adhered to their rehab programs were more likely to be self-

motivated. These findings align with Sarkar and Fletcher's (2012) resilience model which suggest that athletes with high resilience will be more likely to have facilitative responses, such as those demonstrated in the current results (i.e., rehab beliefs), which would lead to an overall sense of effectiveness of the rehab program. Limited research has examined injury employing this model. It should be noted that injury is a common stressor collegiate athletes encounter across their athletic careers, and early findings suggest that resilience may play an important role in maximizing the treatment outcome from the rehabilitation program.

Two of the rehabilitation beliefs scales, severity and rehab value, were not significantly correlated to resilience as hypothesized. With regard to severity, there was considerable variability in the injuries the athletes sustained. Some athletes were out for a shorter period (e.g., three weeks) while others were out for a longer period of time (e.g., 10 months), and it may be that resilience is beneficial to athletes who sustained an injury, regardless of the severity of the injury. That is, for athletes who have to overcome injuries that perhaps only prevent them from playing their sport for a short period (e.g., patellar tendinitis), resilience may still play a key role in overcoming more minor challenges in athletes' sport careers. Minor injuries can cause athletes discomfort, frustration, and force them to refine their goals.

In a similar vein, it may not be surprising that the rehab belief value was not associated with resilience. Rehab belief value was measured with a single item, "Being fully recovered from injury was extremely important to me". The mean score was the highest of all the scales, suggesting that the total sample of athletes were invested in their healing process. It's likely that resilience is important for athletes regardless of the severity of the injury or the length of their rehab program, and this may explain why there was no significant correlation between resilience and the rehab value.

When injury occurs, many athletes work through a rehabilitation process with their athletic trainer or doctor to improve healing. Rehabilitation is a long process for athletes with serious injuries and can range from 6 months to years. For many athletes, it is a disturbing process that causes them to discontinue their sporting career due to lack of confidence, focus, motivation, and social support. In order to have an effective rehabilitation process, however, athletes can possess many attributes or skills that could help accelerate the rehabilitation process or make the rehabilitation process less discouraging and more effective. Factors associated with more successful rehabilitation after injury in sports includes goal setting and having clear objectives during rehabilitation (Evans & Hardy, 2002), believing in the efficacy of treatment (Brewer, Cornelius, & Van Raalte, 2003), and having a rehabilitation practitioner with high expectations for the athletes' adherence (Kolt & McEvoy, 2003) In addition to the athletes' own adherence beliefs and other protective factors addressed in Sarkar and Fletcher's (2012), psychological resilience and optimal sport performance model can be beneficial.

Limitations and Future Directions

While this study provided an important examination of the relationship between collegiate athletes' resilience to their rehab experiences, it was not without limitations. One limitation of this study was that the sample size fell short of the anticipated number of participants that were desired. A larger sample size may have provided greater statistical power to see relationships among resilience and the outcome variables. Collegiate athletes have busy schedules and asking them to voluntarily complete a 10-minute survey could seem a burden. A second limitation was the retrospective nature of the study. Having collegiate athletes recall the process of recovery from their injury that could have occurred up to two years prior is not ideal. Even so, the athletes appeared to have no trouble remembering their emotional and cognitive

responses from their rehab experiences. Another limitation was the liberty taken to modify the wording of the items in the Connor Davidson Resilience Scale (CD-RISC, 2003) and the Sports Injury Beliefs Survey (Taylor & May, 1996) so that they were past tense. It's possible that changing the wording impacted the meaning and context of the items.

Another limitation of this study is that the sample size was not large enough to enable the examination of possible gender differences. It would have been interesting to examine whether males differ significantly from females in the extent that their resilience levels were associated with injury-rehab outcomes. Because the athletes in this study participated in a variety of sports, having a larger sample would be beneficial to determine if the relationships between resilience and athletes' rehab outcomes vary by sport. Track and field athletes were a large majority of the sport athletes surveyed in the study. The demands among that sport demographic are different from other sports because it is both a team sport and an individual sport. It would be beneficial to examine team sport athletes in comparison to individual sport athletes and consider how those athletes' resiliency may differ in terms of the demands within their sport and the subsequent influence on their rehabilitation processes. Additionally, differences within different levels of sports may also impact the results. The collegiate athletes in this study competed in different sports, at a variety of colleges/universities (i.e., NCAA, NJCAA, NAIA) and across different division sport teams, so it is difficult to determine which of these variables might account for portions of the variance.

Fletcher and Sarkar's (2012) theory of psychological resilience is an important model in considering what psychological factors are associated with how individuals deal with stressors and how when they have facilitative responses, it leads to an optimal sport performance. Future researchers might employ a qualitative analysis to examine the relationships. If participants were

asked to explain how resilience may have influenced the process of their injury rehab, it could provide insight to the psychological factors that were exhibited throughout the rehabilitation process. Future researchers might also consider paring qualitative and quantitative methods to examine the relationship between resilience to athletes' rehabilitation beliefs, adherence and effective processes. While there are many queues for future research, the current study provides some support for the role resiliency plays on collegiate athletes' recovery from injury.

Conclusion

Being resilient is important in the sport context because athletes constantly face stressors such as injury that can impede athletic development and performance. To help gain a better understanding of how resiliency could influence the rehabilitation process postinjury, this study examined the relationship between athletes' psychological resilience and rehab beliefs, adherence and effectiveness. Within the three arching categories of stressors (i.e., competitive, organizational, personal), coaches, physical therapist and most importantly athletic trainers that work with injured athletes on a day-to-day basis, may do well to foster resilience in athletes by providing the most effective rehab program for them. Coaches and departmental staffs can also help athletes build resiliency by fostering a positive yet challenging athletic environment for collegiate athletes because it can influence their overall well-being and athletic performance even after an injury occurs (Fletcher & Sarkar, 2016). Furthermore, it may be vital that athletes assess and understand the stressors they experience in their careers because it might aid in developing resilience.

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Appendix

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Appendix A: Extended Literature Review

Psychological Resilience

Psychological resilience has been a growing area of inquiry in the past few decades. Like many concepts in sport psychology, resilience was initially attractive to practitioners, policy makers and in the academic world from the disciplines of material sciences and environmental studies (Meerow, Newell, & Stults, 2016). However, resilience primarily emerged from the developmental psychology literature where research was conducted with children and adolescents who were at risk after exposure to stressful life experiences (Garmezy, 1991; Rutter, 1985). In the past few decades, resilience has gained an increasing amount of attention in the psychology literature where the term is suggested to be operationalized in a variety of ways. Psychological resilience is defined as the role of mental processes and behaviors in stimulating personal resources and protecting individuals from the impending negative results of stressors (Sarkar & Fletcher, 2012, 2013). However, there are many other proposed definitions of psychological resilience based around two concepts which are adversity and positive adaptation. Adversity includes negative life situations or events that statistically correlates with adjustment difficulties (Luthar & Cicchetti, 2000). The second part, positive adaptation, is an adaptation that is considerably greater than what is probable when there is risk exposure to individuals (Luthar & Zelazo, 2003). Luthar et al. (2000) further explained that in resilience research, positive adaptation is operationalized in terms of behaviorally manifested social competence, or success during important developmental stages. Resilience is an important topic to study because people do not react the same way to traumatic events/stressors in their lives or in the athletic realm. Therefore, among competitive athletes, indicators of performance and well-being would be highly relevant to the adversity examined.

McAslan (2010) indicated that resilience suggests an ability or willingness to adapt to change overtime and putatively threatening environment. However, it consists of various factors that promote personal assets and protect individuals from the negative appraisal of stressors. Recovery and coping should be conceived as conceptually distinct from resilience whereas resilience influences the stress process at multiple stages, namely an individual's appraisal of stressor, his or her meta-cognitions in response to felt emotions, and his or her selection of coping strategies (Fletcher & Sarkar, 2013). Connor and Davidson (2003) stated that when resilience has been conceived as a trait, it has been suggested to represent a collection of characteristics that enable individuals to adapt to the stressors they encounter.

To gain a more understanding of psychological resilience, researchers should focus on a performance-based setting where people need to manage adversity and stress to achieve their goals in the realm of competitive sports. Sport performers come across many stressors in their sporting careers. The study of psychological resilience is important in sports because athletes must consistently withstand various pressures to perform at high levels. Pressures or adversities include the following: competitive performances (e.g. preparedness), their sport organizations (e.g. finances), and personal "nonsporting" life events (e.g. bereavement) (Sarkar, and Fletcher, 2013). More recently, researchers (Galli & Vealey, 2008; Fletcher & Sarkar, 2012) are trying measure psychological resilience of elite athletes in a performance-based setting, whereas, before, psychological resilience was more focused on the general population (i.e., children, clinical settings). Fletcher and Sarkar (2012) proposed that hen measuring psychological resilience in sport performers, researchers should assess adversity, positive adaptation, and protective factors to gain a complete representation of sport performer's resiliency.

Theoretical Framework of Resilience

Resilience has been classified as a dynamic process (Luthar, Cicchetti, & Becker, 2000) that changes over time and have acknowledge that within the process, the factors predict how individuals portray their resilient traits. The metatheory of resilience and resiliency includes a range of theoretical ideas from physics, psychology, and medicine (White et al., 2008). Richardson (2002) suggests with this metatheory, research can be categorized in three subcategories or "waves" such as, protective factors (reacting positively to difficult conditions in life), coping with stressors, and the identification of motivational forces within individuals and groups that drive them toward self-actualization in their life. According to Richardson et al. (1990) and Richardson (2002), the metatheory of resilience has the potential to being applied to a wide range of stressors and adversities on an individual, familial, and communal settings.

Richardson (2002) stated that the process of resilience begins with biopsychospiritual homeostasis (i.e., individual's adapted balanced state of mind, body, and spirit). However, there are constant disruptions from stressors, adversity or other forms of change. The disruption from homeostasis occurs when individuals lack the adequate amount of resources (i.e., protective factors) to help fight against the stressors or adversities. After disruption from the homeostasis occurs, individuals adjust to the change and begin the reintegration phase (resilient reintegration, homeostatic reintegration, reintegration with loss, and dysfunctional reintegration). Resilient reintegration is when an individual experience a sense of growth through disruption. Homeostatic reintegration occurs when individuals are trying to overcome adversity but lose some protective factors (e.g., motivation, focus) along the way. Lastly, dysfunctional reintegration occurs when individuals partake in disruptive behaviors such as drug use, or other forms of behaviors to deal with the negative effects of stressors.

Although this is a good model to explain how individuals deal with stressors or adversities in a variety of ways, (e.g., sport participation) (Galli & Vealey, 2008) it has some limitations. The model only considers one event relative to individuals' experiences and not multiple disruptions simultaneously (Richardson, 2002). The model asserted that disruptions result in primary emotions, however, it does not examine how meta-cognition and meta-emotions influences the reintegration process (Jager & Bartsch, 2006). Fletcher and Sarkar (2012) suggested that the cognitive appraisal of emotions is an important component of the resilience process and people who are resilient also appraise emotions as facilitative to their functioning. In addition, the model does not take coping-oriented processes into account. Connor and Davidson (2003) discussed the model in their work and concluded that resilience may be viewed as an important factor that influences a successful stress coping mechanism.

Measuring Resilience

There have been controversies about how to best assess resilience due to its complex components. Resilience researchers have previously measured resilience by evaluating factors that protect individuals from stressors and considered the three components of resilience (i.e., adversity, positive adaptation, and protective factors) (Connor-Davidson, 2003; Wagnild & Young, 1993). More specifically, researchers are interested in measuring psychological resilience in sport performers to gain more understanding of how athletes are affected psychologically (e.g. Fletcher & Sarkar, 2012; Galli & Vealey, 2008). However, Gucciardi and Jackson. (2015) explained that in order to measure resilience to collect a thorough analysis of the methodological review pertaining to athletes, "scholars must develop a sport-specific measure of resilience" (p.31). Sarkar and Fletcher (2013) discussed that researchers should first measure stressors or adversities by identifying significant life events and ongoing daily stressors athletes

can control, when trying to assess psychological resilience in sport performers. Researchers should then measure positive adaptation that are specific to the risks associated with competitive athletes' sport performance and well-being. The third measurement should include protective factors that should be assessed across all levels of analysis justifying the review of risk and protective factors specific to performance and stressors athletes encounter (Sarkar & Fletcher, 2013).

More recently, Sarkar (2015) investigated the assessment of psychological resilience in sport performers, specifically the development of a sport-specific measure of resilience to advance a valid and reliable measure of psychological resilience in sport performers in addition to testing Fletcher and Sarkar's (2012) theoretical model of sport resilience (p.15). The findings revealed that there is much work needed to be done to advance resilience researcher's knowledge and understanding of resilience measures that fully include and support Fletcher and Sarkar's (2012) model of resilience.

The Connor-Davidson (CD-RISC) Resilience scale (2003) is a self-applied multidimensional tool of 25-items measuring athletes' ability to face and overcome adversity in five different factors: locus of control and commitment, challenge of behavior towards individual actions, adaptation to stressful and spiritual situations, resistance to discomfort, and optimism. Used in the clinical psychological world, there is support for its internal consistency, reliability and convergent and divergent validity (Connor & Davidson, 2003). The resilience scale has also been proven to be a good psychometric tool for assessing athletes' self-perception of the capability for recovery (Olmo Extremera et al., 2017).

Psychological Resilience in Sport

Researchers (Gould, Dieffenbach, & Moffett, 2002; Weissensteiner, Abernethy, & Farrow, 2009; Johnston, Harwood, & Minniti, 2013; Sarkar & Fletcher, 2012) have pointed out the importance of resilience in reaching high levels of sport performance. In a study assessing the psychological characteristics of Olympic gold medalists, Gould, Dieffenbach, and Moffett (2002) acknowledged two categories linked to resilience: the handling of pressure and adversity, and the psychological characteristics to overcome these stressors and adversities. The researchers found that Olympic champions had certain psychological qualities such as self-confidence, focus skills, hard work ethic, and optimism that helped them manage various stressors of daily demands. Weissensteiner, Abernethy, and Farrow (2009) found that in order to be an expert in one's sport, resilience is fundamental for that growth. Additionally, Johnston, Harwood, and Minniti (2013) found that resilience is an important psychosocial resource for developing young competitive swimmers.

Within the investigation of psychological resilience in sport performers, Galli and Vealey (2008) explored athletes' perceptions of their experiences of resilience in sport using Richardson's (2002) resilience model. They aimed to answer three questions: (1) how does the resilience process work in sport? (2) What factors influence athletes' response to adversity? and (3) what role does the experience of adversity play in helping athletes to be resilient? They interviewed ten male and female former collegiate and professional athletes in various sports using semi-structured approach to understand their perceived experiences of resilience in sport (p. 320). The interview revealed some adversity themes. Athletes' most difficult adversity included injury, performance slump, burnout, transition to college, and illness (p. 321). Galli and Vealey (2008) found five dimensions describing the resilience experiences of athletes: Breadth

and duration, agitation (i.e., using coping strategies to deal with unpleasant emotions and mental hardship), sociocultural influences (e.g., social support and cultural factors), personal resources (e.g., competitiveness, passion for sport, persistence, etc.), and positive outcomes (e.g., realization of support, learning, etc.). It is important to note that during the agitation phase, athletes utilize both cognitive and behavioral coping strategies to handle unpleasant emotions and mental struggles, ultimately leading them to a positive. Participants in Brown, Lafferty & Triggs (2012) highlighted passion in sport to be a key element in contributing to resilient reintegration into elite winter sports. When athletes pull from their personal resources to overcome adversities in their sport (e.g., displaying love and passion for the sport) it creates a positive psychological motivation for them to continue to participate and eventually succeed through adversity.

Being an Olympic athlete is one of the zeniths of sport achievement and thus one that brings about many challenges for an athlete. Athletes who can manage the high pressure, expectations, and stress effectively are often the most successful athletes at the Olympic Games. Sarkar and Fletcher (2012) developed a grounded theory of psychological resilience after interviewing twelve Olympic champions to understand the relationship between psychological resilience and optimal sport performance. They found several psychological factors (positive personality, motivation, confidence, focus, and perceived social support) promoting athletes' personal assets and aiding as a protection from potential negative effects of stressor. In the grounded theory, psychological resilience was represented as an overarching concept that summarizes stressors, cognitive appraisal and meta-cognitions (i.e., individual's knowledge of, and control over his or her cognition), psychological factors, and facilitates responses. Olympic champions encountered a wide variety of stressors in their sporting career which varied

considerably in their frequency, intensity and duration that were classified under three main categories: Competitive, organizational, and personal stressors. To appraising stressors as challenging, Olympic gold medalists withstood the demands they encountered by evaluating their own thoughts. Fletcher & Sarkar (2012) found that the Olympic athletes were self-ware of their goals when they were confronted with specific situations and used some psychological strategies (i.e., goal-setting imagery, self-talk, relaxation & activation) to control their cognitions and images during the height of their career. The athletes also accepted that past experiences had the potential to help their sport performance.

The processes of challenge appraisals and meta-cognitions promoted facilitative responses in Olympic gold medalist. Galli and Vealey (2008) found that adversity relating to injury, performance slump and transition to college, sociocultural influences such as social support and personal resources such as determination and competitiveness and passion for one's sport were the main strategies of resilience processes that leads to positive outcomes. In Brown, Lafferty, & Triggs (2012) study, all of the participants mentioned that they experienced a negative impact on their emotions as a response to their adversity. There were heightened levels of anger immediately after the occurrences of adverse circumstances, and increased worry especially with new and uncertain circumstances. Following the evaluation of an event, taking action was an important feature of facilitative responses for the majority of Olympic champions. It has been suggested that facilitative responses such as increases in effort and commitment to decisions aided performance in world-class athletes, particularly when confidence is high (Hays, Thomas, Maynard & Bawden, 2009).

Within Fletcher and Sarkar's (2012) grounded theory of psychological resilience, it is important to discuss the categories of stressors and the five main components of protective

factors that help competitive sports performers withstand the demands of sport. Sport psychology researchers (Gould, Jackson, & Finch, 1993; Woodman & Hardy, 2001; Mckay et al., 2008; Mellalieu et al., 2009) have discussed all possible types of stressors encountered by sport performers which are linked with competitive performance, athletes' sport organization, and personal nonsporting life events.

Competitive stressors. Competitive stressors are environmental demands related to competitive performance (Mellalieu, Hanton, 2006). Stressors related to competitive sports include the following: sport related injuries, pressures from coaches and teammate, and other external forces to perform well (Gould et al., 1993; Mckay et al., 2008), preparations, underperforming, expectations, self-representation (Hanton, Fletcher, & Coughlan, 2005; Mellalieu et al., 2009; Neil, Hanton, Mellalieu, & Fletcher, 2011), and rivalry related stressors (Thelwell et al., 2007). Injury-related pressures include the risk of sustaining an injury, the risk of being deliberately injured due to opponent's actions, the act of getting injured, determining the cause of injury, the inability to train, missing important competitions, loss of fitness, attaining pre-injury levels of performance, competing whilst injured, and the pressure to perform well (Evans, Wadey, Hanton, & Micthell, 2012; Sarkar & Fletcher, 2013).

Organizational stressors. Organizational stressors are stressors that are associated with the environment to which sport performers operate (Fletcher et al., 2006). Elite athletes experienced more demands associated primarily with sport organization than with competitive performance (Hanton et al., 2005). Arnold and Fletcher (2012) found four main categories of organizational stressor. These include leadership and personal issues (i.e., coaches' behaviors and interactions, coach's personality and attitudes, support staff, sport officials, external expectations, etch.), cultural and team issues (i.e., teammates' behaviors and interactions,

communication issues, team atmosphere and support, cultural norms, etc.), logistical and environmental issues (i.e., facilities and equipment, structure of training, travel, accommodations, rules and regulations, etc.), and performance and personal issues (i.e., injuries, diet and hydration, finances, & career transitions). More recently, Tabei, Fletcher, and Goodfer (2012) investigated the relationship between organizational stressors and burnout rates of collegiate soccer players. They found that common types of organizational stressors (i.e., training and competition overload, travel arrangements, risk of injury, lack of social support) resulted in higher burnout rates.

Personal Stressors. Personal stressors are stressors that the environment places on individuals that are primarily and directly related to nonsporting life events (Sarkar & Fletcher, 2014a). Common types of personal stressors are problems with personal relationships, family issues and responsibilities, death of a family member or significant other (Mckay et al., 2008; Weston et al., 2009), balancing educational goals and personal relationships (Mckay et al., 2008). In addition, Thelwell et al. (2007) identified that sport performers have experienced financial pressures to provide for their families.

Protective Factors. Sport psychology researcher not only examine the common stressors competitive sport performers experience. They also strive to understand the characteristics of individuals who excel through adversity. Protective factors are influences that modify or alter a person's response to environmental demands that prompts a maladaptive outcome (Rutter, 1985; Sarkar and Fletcher, 2013). From Fletcher and Sarkar's (2012) grounded theory, the best athletes utilize five main categories of protective factors to withstand the stressors they experience (e.g. positive personality, motivation, confidence, focus, and perceived social support).

***Positive Personality*.** Positive personally trait is when individuals exhibit persisting patterns of thoughts, feelings, and behaviors that help guide them to respond positively under stressful conditions (Roberts, 2009). Fletcher & Sarkar (2012) found that gold medalists were proactive in their sporting careers which gave them the ability to identify opportunities in the environment and act on them to bring about meaningful change. Within positive personality are a few important contributors to successful resiliency within athletes. These are optimism, adaptive perfectionism, competitiveness, proactivity, and hope. Optimism is a trait-like expectancy for successful outcomes. Optimism has been linked to low level of competition anxiety (Wilson, Raglin, & Pritchard, 2002), better emotional modifications during competition (Sarkar & Fletcher, 2013), and more confident resulting in better performance during a task (Martin-Krumm et al., 2003).

Adaptive perfectionism is when individuals have high standards and willingness to strive for excellence while having little concerns for mistakes and doubts (Stoeber & Otto, 2006). This positive personality has been linked with low levels of anxiety (Stoeber et al., 2007), and competitive self-confidence (Stoeber e al., 2008). Competitiveness is having the desire to win. MacNamara et al., (2010a; 2010b) interviewed elite sport performers and found that athletes with higher competitive drive adapted well to setback such as injuries or performance slump. Proactivity is when individuals take immediate action during life circumstances to influence their environments (Bateman & Crant, 1993). Proactive personality has been linked with higher levels of achievements in sport and deemed as an important component for withstanding pressures of performance at an elite level (Sarkar & Fletcher, 2012). Hope is a cognitive sense of successful goal directed grit and a way to meet individual goals (Synder et al., 1991). Athletes with higher hope are more likely to develop strategies to overcome challenges and are more dedicated to

achieving their goals. Sport performers with high sense of hope had lower perceptions of burnout (Podlog & Dionigi 2010).

Motivation. High levels of motivation are a psychological characteristic of the ability to withstand stressful situations for elite sport performers (Treasure, Lemyre, Kuczka, & Standage, 2007). Olympic champions had many motives for competing at the highest level and therefore appreciated and judged external demands as important by choosing to perform in challenging and high sport environments (Fletcher & Sarkar, 2012). Alternatively, in a research investigating motivation of elite performers within a controlled social condition, Mallet & Hanrahan (2004) explored the motivational processes of elite track and field athletes in Australia using semi-structured interviews. The findings revealed that resilient athletes were able to internalize and integrate more self-determined forms of extrinsic motivation because they found ways to evaluate and consider the environmental demands of sports.

Confidence. Confidence is the degree of certainty one possesses about their ability to be successful in sport while withstanding stress and pressure (Galli & Vealey, 2008). Self-confidence is a positive influence on athletic performance (Woodman & Hardy, 2003). Athletes with high self-confidence work harder and persist in tasks for a longer period of time to achieve more (Cox, 2002). Confidence is important when looking at the stress-resilience-performance relationship in Olympic champions. Fletcher & Sarkar (2012) found that most of the Olympic champions had extremely high levels of self-confidence at the peak of their careers. According to Perez (2007), overcoming a first set loss in tennis involves the athlete's ability to defeat negative momentum. Psychological momentum is a positive or negative change in cognition that may be caused by an event or series of events that affects performance (Taylor & Demick, 1994). Some athletes either overcome adversity through positive psychological momentum or are affected by

adversity through negative psychological momentum. Given the consistent findings with self-confidence and sport performance, Perez (2007) hypothesized that tennis players with high levels of self-confidence will more likely win a match following a first set of loss. An interesting observation to consider is that women in sports may have higher self-confidence, higher self-esteem, and positive assessments of their physical competence than do women in non-athletics (Miller & Levy, 1996). However, male athletes display lower level of anxiety and higher levels of self-confidence than female athletes (Scanian & Passer, 1979). This interesting comparison may play a role for tennis player's ability to bounce back after a first-set loss because self-confidence impacts the player's motivation and performance after the first set loss (Perez, 2007). Because men display lower level of anxiety and higher level of self-confidence, they may be more resilient to the first set loss.

Focus. Fletcher and Sarkar (2012) found that the ability to focus is important when studying the resilience characteristics of elite sport performers. Focus is when an individual employs purposeful mental effort on what is most important to them in a given situation (Moran, 1996). Focusing on the process versus the outcome is important and a great contributor to the success in sport because it reduces distractions. Most importantly, it minimizes the risk of injury perceived to negatively influence sport performance (Greenleaf, Gould, & Dieffenbach, 2001). Research has found that focusing on the task-related cues are vital mental traits that help elite athletes adapt to setbacks when transitioning to excellence (MacNamara & Collins, 2010). Additionally, Mallet and Hanrahan (1997) found that sprinters in track and field who had been trained to use race plans that focuses on the task at hand, ran faster than the athletes in the control group. Since focus has a positive influence on athlete's cognitive processes during competition, it is evident to claim that it increases psychological resilience.

Perceived Social Support. Social support is an important aspect and buffer for the effect of perceived stress. High quality social support whether it comes from parents, family, or outside sources are ways athletes deal with adversity. Perceived social support is when individuals have or perceive their availability to one potential access and is a recipient of social support from friends, teammates, coaches, athletic trainers, and family when assistance is needed (Freeman, Coffee, & Rees, 2011). Fletcher & Sarkar (2012) found that the perception of available support from a variety of social agents were a factor that reinforced the stress-resilience-performance relationship in elite sport performers suggesting that it is an important component to the resilience trait. Athletes relied on four dimensions of social support while dealing with their adversity (i.e., emotional, esteem, informational, and tangible) (Rees & Hardy, 2000). For injured athletes, social support from multiple sources including the athletic trainers have been proven to be the make or break between success following post recovery. In turn, athletes must enter the maturity trait to want to seek out help rather than isolating themselves from others. In Brown, Lafferty, & Triggs (2012) study, all their participants expressed their external support systems relative to their resilient reintegration. Additionally, when athletes have a perception that they have accessible support, they will be less stressed and more resilient.

Training Resiliency Through Intervention

Researchers can explore resilience in various ways to advance the knowledge of psychological resilience in sport performers. Sarkar and Fletcher (2014a) stated that when advancing this construct, researchers can explore how significant adversities influence the resilience-high achievement relationship. One area resilience quality can improve sport performance is through evidence-based resilience training. It is essential for sport performers to positively evaluate and interpret the pressure they encounter when developing resilience

(Fletcher & Sarkar, 2016). Through practice, repetition and feedbacks, resiliency can be improved within athletes. Comprehensive psychological skills training programs have become increasingly popular (Weinberg & Gould, 1995). Visualization, consistency of effort, camaraderie, confidence in training, and focus on relevant cues have been some common techniques used by athletes and coaches to improve sport performance. Coping skills are important factors in competitive sport performance and a way to protect oneself against negative effects of failure. Mummery, Schofield, & Perry (2004) explored how coping styles can be a protective factor against negative effects of failure in sports. They found that successful and resilient performers scored more highly than non-resilient athletes on the "coping with adversity" and "peaking under pressure" subscales of Athletic Coping Skills Inventory (ACSI-28; Smith, Schutz, Smoll, & Ptacek, 1995).

Fletcher & Sarkar (2016) implemented the 'mental fortitude training' program for elite sport athletes and focused on three main areas when enhancing performance under pressure (i.e., personal qualities, facilitative environment, and challenge mindset). The program emphasizes the need for helping individuals to positively evaluate and interpret the pressure they encounter in their sport through the athlete's own resources, thoughts, and emotions. Furthermore, coaches and leaders can create supportive environments for their athletes to grow resiliency when trying to sustain success and wellbeing. The challenge-support matrix can be categorized in the following ways: low-challenge-low-support (stagnant environment), high-challenge-low-support (unrelenting environment), low-challenge-high-support (comfortable environment), and high challenge-high support (Facilitative environment).

Fletcher & Sarkar, (2016) proposed that when athletes are in an environment with too much challenge but not enough support, they are experiencing the unrelenting environment

which is characterized by “unhealthy competition, leaders exposing and ridiculing under performers, a blame culture when high standards are not met, and avoidance mentality due to the consequences of making mistakes, little care for well-being, people feeling isolated, potential conflict, unsustainable performance, potential burnout, and a ‘sink or swim’ attitude.” Inversely, when athletes are experiencing too much support but not enough challenge, they are experiencing a comfortable environment that does not enhance performance or promote a resilient trait. Facilitative environment is characterized by supportive challenges towards a goal, individual having input into and taking ownership of goals, individuals seeking out challenges to develop, individuals craving constructive feedback, a good relationship between performers and leaders or coaches, a psychologically safe environment that encourages sensible risk-taking, healthy competition, everyone supporting one another, learning from mistakes and failure, recognition and celebration of success, and a ‘we’re in this together’ attitude. Essentially, what the researchers are suggesting is that coaches and leaders should implement this type of facilitative environment for athletes to have a balanced excellence and well-being in their respective settings through effective motivational and developmental feedbacks.

Gonzalez, Detling, & Galli (2016) described sport psychology consultant experiences of developing resilience within elite athletes using case studies to illustrate how to take resilience-based research to practice. The case studies revealed that mental skills training such as relaxation training, confidence building, team building, and re-focusing skills were useful to consultants to equip athletes with facilitative thoughts and behaviors in response to adversity.

The first case study was about an injured Olympic Female freestyle aerialist who had sustained a severe injury just one month before the Olympic Games. Consultants noticed that the athlete had a high supportive social network that helped her get through her injury. They created

competition set-back, and success scenarios with imagery to help boost future emotional reactions and build self confidence in rehabilitation. Through the intervention, the athlete later made three U.S Winter Olympic teams, won several U.S championship, making her the most decorated athlete in U.S freestyle aerial skiing.

The second case study was about a defeated high school baseball pitcher who was overtaken by his nerves and perceived pressures of the game of baseball in his first year of college, following an undefeated and successful senior year in high school. The athlete also had a very strong supportive family and teammates; however, his strength was challenged from a dominating performance by his opponent at the state championship game where he took a loss (Gonzalez, Detling, & Galli 2016). Consultants assessed his case and realized that they had to build up his confidence, optimism, and coping skills during anxious times in competition. The athlete was primed to focus on aspects of his performance and learning to let go of mistakes through kinesthetic and mental cues for its resetting benefits (Ravizza & Hanson, 1998). The consultants also targeted his competitive state anxiety through deliberate breathing exercises and learning to "stay in the moment." As a result, the athlete focused on developing resilient qualities such as believing in accomplishing goals despite obstacles and the ability to clearly think under stress.

The third and final case study was about the United States National Team with poor team comradery. They had a culture of disrespect, frustrations within team members, poor attitudes about training and lack of enjoyment, but where they were faced most with adversity was in funding and resources (Gonzalez, Detling, & Galli 2016). The biggest barrier was lack of social and environmental support, so the consultant began working on ways to build up the team through bonding exercises (p.165). The activities addressed issues of trust and effective

teamwork. Because of the activities, the researchers were able to see some resilient qualities and behaviors that emerged (p.166). The athletes and coaches expressed building a relationship with at least one person on the team, they exhibited a higher motivation to train and a sense of mental toughness and as a result, they had the best season of their careers.

Injury and Rehabilitation

Sport injury, especially those involving surgery affect athletes psychologically and physically (Brewer, 2007). Negative cognition, emotion and behaviors can be effects of sport injury commonly exhibited by athletes, especially when the athlete experiences a major injury that requires surgery (Brewer, 2007).

Injury rates in collegiate American Football players are higher in the preseason period (Steiner et al. 2016) because the preseason period encompasses a period of high and risk for player injury. Research has suggested that a greater training load particularly in the preseason preparation phase, can increase resilience and substantially which then result in greater player availability in-season (Murray et al., 2018). Murray et al., (2018) defined injury as any physical complaints reported to athletic training staff by a player regardless of whether it resulted in time loss or not (p. 174). They investigated whether the participation in a higher percentage of preseason sessions affect the injury profile within Division1-A American collegiate athletes and concluded that there is a possibility that an increase in exposure to training may develop an 'injury resiliency' effect and that the increased risk with lower training exposure is in-keeping with the training literature that suggests high chronic loads are protective.

Recovery is characterized by a temporary period of psychopathology followed by gradual restoration to healthy levels of functioning, whereas resilience refers to the ability of individuals

to maintain normal levels of functioning (Fletcher & Sarkar, 2013). Individuals experiencing the recovery stage of their injury may experience depression and difficulties completing their normal tasks, but they also persevere and gradually begin to return to their normal level of functioning over a period of time (Mancini & Bonanno, 2009). Individuals who exhibit resilient traits continue their typical lifestyles with little to no discernable disruptions in their daily functioning.

To gain an understanding of athletes' resilience perception, this study will also measure athletes' rehabilitation believes, rehabilitation adherence, and the effectiveness of the rehabilitation process in relation to their perceived resilience.

The Sports Injury Rehabilitation Beliefs Survey. Increasing an athletes' perception of the severity of their injury, self-efficacy, treatment efficacy, and susceptibility to rehabilitation may increase their motivation to comply to the rehabilitation process (Taylor & May, 1996). The Sports Injury Rehabilitation Beliefs Survey (SIRBS) was developed by Taylor and May (1994) to assess athletes' beliefs or value of satisfactory rehabilitation of their perceived severity and susceptibility, self-efficacy, and treatment (outcome) efficacy after sports injury. The aim of their study was to determine if the threat appraisal (Susceptibility and severity) and coping appraisals (self-efficacy and treatment efficacy) were related to sports injury rehabilitation compliance. They chose one sport injury clinic on a British university campus using student-athletes from all levels of participation (p.473). At the end of athlete's first appointments, they were invited to participate. The 19-item SIRBS and other demographic questionnaires were distributed and were to be completed by the athletes after leaving the clinic. The data results revealed that there is some support for the construct validity and internal alpha coefficients for each scale of the SIRBS. The findings also provided evidence about the level of compliance with home-based rehabilitation programs involving prescribed modalities or rest and support for the role of threat

appraisal as a determinant of compliance with sports injury rehabilitation, both in the prescribed modalities and rest; while further result supported that coping appraisal is a factor of compliance to prescribed modalities but not to controlled involvement in inappropriate activities (Taylor & May, 1996).

Sport Injury Rehabilitation Adherence Scale. The Sport Injury Rehabilitation Adherence Scale (SIRAS) (Brewer et al., 2000) was developed as a tool to measure patient adherence during clinic-based rehabilitation sessions that was rated by the rehabilitation physician. There is support for the test-retest reliability (intra-class correlation = 0.77 during 1-week period) and internal consistency (Cronbach alpha =0.82) for the SIRAS (Brewer et al., 2000) and support for the construct validity (Brewer et al., 2002). In addition, Kolt et al. (2007) confirmed that the SIRAS is a psychometrically sound measure of the adherence to clinic-based rehabilitation from musculoskeletal injury. However, the SIRAS measure only the athletic trainer's or physician's perception of the athletes' adherence to recovery rather than the athletes' own perception of their own adherence to their recovery post injury. It is important to gain the athletes' own perception of their rehab adherence because it displays how they themselves perceive their hard work during the rehabilitation process.

Rehabilitation Effectiveness. Athletic trainers or physicians would benefit from education on the psychological aspects of injury and specifically the use of psychological skills within the rehabilitation programs by following the educational standards (National Athletic Trainers' Association, 2006). When athletes are given effective rehabilitation programs in addition to them rehabbing effectively, the result would likely demonstrate a greater and quicker physical strength than is typical for their injury. It is important to measure effectiveness because there is variability in the recovery phase tailored to each athletes' rehabilitation program.

Measuring the rehabilitation effectiveness may reveal why some athletes recover sooner than other athletes and how it relates to their perceived resilience. However, there is very limited research on athletes' perceived rehabilitation effectives, and thus why this study aims to advance the particular realm in analyzing how athletes' perceived resilience relates to their rehabilitation programs.

Conclusion

Psychological resilience is an important construct in analyzing competitive sport performance's great performance outcome after having dealt with the stressors discussed in Fletcher's and Sarkar (2012) grounded theory of psychological resilience. However, research is needed to further address the relationship between injured collegiate athlete's perception of their resilience to their rehabilitation beliefs, adherence, and effectiveness and how the components of psychological responses to adversity aided in rehabilitation outcomes within the three variables.

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Appendix B: Demographics

Please Fill in or choose the appropriate response to all of the following questions:

What is your age? _____

What is your gender identity?

☐ Female
☐ Male
☐ Non-binary/third gender
☐ Prefer not to say
☐ Prefer to self-identify: _____

Choose one or more races that you consider yourself to be:

☐ Black, Afro-Caribbean, or African America
☐ Non-Hispanic White or Euro-American
☐ East Asian or Asian American
☐ South Asian or Indian American
☐ Latino or Hispanic/ Hispanic American
☐ Middle Eastern or Arab/ Arab American
☐ Multi-ethnic/ Mixed Race (please specify): _____
☐ Other (please specify): _____

What year are you in school?

☐ Freshman
☐ Sophomore
☐ Junior
☐ Senior
☐ 5th year
☐ Graduate Student (indicate year/term): _____
☐ Sport Redshirt year

What Division University/ College athlete are you?

☐ I
☐ II
☐ III
☐ NAIA
☐ NJCAA

What university or college are you currently attending?

_____

What sport(s) do you participate in?

☐ Baseball
☐ Basketball
☐ Beach Volleyball
☐ Bowling
☐ Competitive Cheer
☐ Competitive Dance
☐ Cross Country
☐ Fencing
☐ Field Hockey
☐ Football
☐ Golf
☐ Gymnastics
☐ Ice Hockey
☐ Indoor Track and Field
☐ Lacrosse
☐ Outdoor Track and Field
☐ Rifle
☐ Rowing
☐ Skiing
☐ Soccer
☐ Softball
☐ Swimming & Diving
☐ Tennis
☐ Volleyball
☐ Water Polo
☐ Wrestling

Do you currently receive an athletic scholarship for your sport(s)?

☐ Yes
☐ No

If you answered 'yes' to the previous question, was your athletic scholarship full or partial?

☐ Partial
☐ Full
☐ N/A

How many years have you been participating in your sport at the university/ college?_____

How many years of your life have you been participating in your sport?_____

In the past 2 years, have you had a major injury (no participation in practice or competition for a minimum of 3 weeks where you were only receiving treatment and/or rehab during this period)?

☐ Yes ☐ No

What was your major injury?

_____

Were you instructed by your athletic trainer, doctor, or physical therapist to complete a rehabilitation program?

☐ Yes (indicate which one): _____ ☐ No

How long did your athletic trainer, doctor, or physical therapist estimate your rehabilitation program length will be? _____

I felt well informed or educated about what to expect with my injury.

☐ Very Strongly Disagree
☐ Strongly Disagree
☐ Disagree
☐ Neither Agree nor Disagree
☐ Agree
☐ Strongly Agree
☐ Very Strongly Agree

I felt well informed or educated about my rehabilitation process.

☐ Very Strongly Disagree
☐ Strongly Disagree
☐ Disagree
☐ Neither Agree nor disagree
☐ Agree
☐ Strongly Agree
☐ Very Strongly Agree

Where did you receive most of your information about your injury?

☐ Athletic trainer
☐ Coach
☐ Doctor
☐ Physical therapist
☐ Other (please specify):_____

Where did you receive most of your information about your rehabilitation process?

☐ Athletic trainer
☐ Coach
☐ Doctor
☐ Physical therapist
☐ Other (please specify): _____

Appendix C: Connor Davidson Resilience Scale (CD_RISC; 2003)

Please respond to the following statements using the scale shown below:

During the period I was rehabbing from my injury…	Not true at all	Rarely true	Sometimes true	Often true	True nearly all the time
1. I was able to adapt when changes occurred.	☐	☐	☐	☐	☐
2. I had at least one close and secure relationship that helped me when I was stressed.	☐	☐	☐	☐	☐
3. When there was no clear solutions to my problem, sometimes fate or God helped me.	☐	☐	☐	☐	☐
4. I dealt well to whatever came my way.	☐	☐	☐	☐	☐
5. Past successes gave me confidence in dealing with new challenges and difficulties.	☐	☐	☐	☐	☐
6. I tried to see the humorous side of things when I was faced with problems.	☐	☐	☐	☐	☐
7. Having to cope with stress made me stronger.	☐	☐	☐	☐	☐
8. I tend to bounce back after illness, injury, or hardships.	☐	☐	☐	☐	☐
9. Good or bad, I believed that most things happened for a reason.	☐	☐	☐	☐	☐
10. I gave my best effort no matter what the outcome may be.	☐	☐	☐	☐	☐
11. I believed that I achieved my goals, even when there were no obstacles.	☐	☐	☐	☐	☐
12. Even when things looked hopeless, I didn't give up.	☐	☐	☐	☐	☐
13. During times of stress/crisis, I knew where to turn for help.	☐	☐	☐	☐	☐
14. Under pressure, I stayed and thought clearly.	☐	☐	☐	☐	☐
15. I preferred to take the lead in solving problems rather than letting others make all the decisions.	☐	☐	☐	☐	☐
16. I was not easily discouraged by failure.	☐	☐	☐	☐	☐
17. I thought of myself as a strong person when dealing with life's challenges and difficulties.	☐	☐	☐	☐	☐
18. I made unpopular or difficult decisions that affected other people, when it was necessary.	☐	☐	☐	☐	☐
19. I was able to handle unpleasant feelings like sadness, fear, and anger.	☐	☐	☐	☐	☐
20. In dealing with life's problems, sometimes I had to as on a hunch without knowing why.	☐	☐	☐	☐	☐
21. I had a strong sense of purpose in life.	☐	☐	☐	☐	☐
22. I felt in control of my life.	☐	☐	☐	☐	☐
23. I liked challenges	☐	☐	☐	☐	☐
24. I worked to attain my goals no matter what roadblocks I encountered along the way.	☐	☐	☐	☐	☐
25. I took Pride in my achievements.	☐	☐	☐	☐	☐

Appendix D: Sports Injury Rehabilitation Beliefs Survey (Taylor and May, 1996)

Please respond to the following statements using the scale shown below:

During the period I was rehabbing from my injury…	Very strongly disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Very strongly agree
1. My recovery from injury was hindered because I did not complete the rehabilitation program.	☐	☐	☐	☐	☐	☐	☐
2. In order to prevent a recurrence of this injury, my rehabilitation program was essential.	☐	☐	☐	☐	☐	☐	☐
3. The way to prevent my injury from worsening was to follow my rehabilitation program.	☐	☐	☐	☐	☐	☐	☐
4. A successful and lasting recovery may have not been possible if I had not completed my rehabilitation program.	☐	☐	☐	☐	☐	☐	☐
5. I made it more likely that I did re-injure by not doing what my rehabilitation program involved.	☐	☐	☐	☐	☐	☐	☐
6. The rehabilitation program designed for me ensured my complete recovery from this injury.	☐	☐	☐	☐	☐	☐	☐
7. Completion of my rehabilitation program would guarante that I recover from my injury.	☐	☐	☐	☐	☐	☐	☐
8. Following the advice that I was given had a very large impact upon how quickly I recovered from this injury.	☐	☐	☐	☐	☐	☐	☐
9. I had absolute faith in the effectiveness of my rehabilitation program.	☐	☐	☐	☐	☐	☐	☐
10. I was very capable of successfully completing all aspects of my rehabilitation program, even when it involved being less active or something which was discomforting.	☐	☐	☐	☐	☐	☐	☐
11. I considered myself able to stick to my rehabilitation program even though it included activities which I did not enjoy.	☐	☐	☐	☐	☐	☐	☐
12. I had no serious difficulty in following the instructions of my rehabilitation program.	☐	☐	☐	☐	☐	☐	☐

13. I believed that I would stick with my rehabilitation program despite any difficulties I encountered.	☐	☐	☐	☐	☐	☐	☐
14. Fully recovering from injury was extremely important to me.	☐	☐	☐	☐	☐	☐	☐
15. As injuries go, mine was serious.	☐	☐	☐	☐	☐	☐	☐
16. I saw this injury as a serious threat to my sport/exercise involvement.	☐	☐	☐	☐	☐	☐	☐
17. I feared that this injury would affect my long-term sports involvement.	☐	☐	☐	☐	☐	☐	☐
18. This injury was too serious not to follow medical advice.	☐	☐	☐	☐	☐	☐	☐
19. Injuries like this were minor interruptions to my sport/exercise involvement.	☐	☐	☐	☐	☐	☐	☐

Appendix E: Rehabilitation Adherence Survey (Sanni & Fry, 2019)

Please respond to the following statements using the scale shown below:

During the period I was rehabbing from my injury…	Very strongly disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Very strongly agree
20. I followed my athletic trainer's/doctor's directions completely.	☐	☐	☐	☐	☐	☐	☐
21. I attended all my rehabilitation sessions.	☐	☐	☐	☐	☐	☐	☐
22. I completed all exercises assigned to me (outside of rehabilitation sessions)	☐	☐	☐	☐	☐	☐	☐

Appendix F: Rehabilitation Effectiveness Survey (Sanni & Fry, 2019)

Please respond to the following statements using the scale shown below:

During the period I was rehabbing from my injury…	Very strongly disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Very strongly agree
1. I rehabbed more quickly than is typical for athletes with my injury.	☐	☐	☐	☐	☐	☐	☐
2. I felt strong and physically healthy.	☐	☐	☐	☐	☐	☐	☐
3. I felt ready to transition into a full training routine.	☐	☐	☐	☐	☐	☐	☐
4. I felt like I was back on track with my athletic career.	☐	☐	☐	☐	☐	☐	☐

Appendix G: Recruitment Email

Hello Listserv,

My name is Zainab Sanni, I am a master's student in the Sport Psychology program at The University of Kansas, working under the direction of Dr. Mary Fry. With my thesis research, I am interested in examining the relationship between injured collegiate athletes' resiliency and their experiences during their rehabilitation process.

I will greatly appreciate it if you forward the link below to collegiate athletes (or coaches, athletic trainers, strength and conditioning coaches, etc. who are working with collegiate athletes) who participate in any NCAA, NAIA, and NJCAA Division sports programs, and might be willing to complete an anonymous 10-minute online survey.

Criteria for participants' inclusion in the study are as follows:

- Ages 18-25 years,
- Have had a major injury within the past two years that prevented them from participating in practice/competition for a minimum of a 3-week period during which they only completed treatment and/or rehabilitation, and
- Received physical therapy (rehabilitation) or surgery after the injury occurred.

Link to the study:
[redacted]

Thank you for your help,

Zainab Sanni
[redacted]

Hello Coaches, Athletic Trainers, and Strength and Conditioning Coaches,

My name is Zainab Sanni, I am a master's student in the Sport Psychology program at The University of Kansas, working under the direction of Dr. Mary Fry. With my thesis research, I am interested in examining the relationship between injured collegiate athletes' resiliency and their experiences during their rehabilitation process.

I will greatly appreciate it if you forward the link below to collegiate athletes (or coaches, etc. who are working with collegiate athletes) who participate in any NCAA, NAIA, and NJCAA Division sports programs, and might be willing to complete an anonymous 10-minute online survey.

Criteria for participants' inclusion in the study are as follows:

- Ages 18-25 years,

- Have had a major injury within the past two years that prevented them from participating in practice/competition for a minimum of a 3-week period during which they only completed treatment and/or rehabilitation, and
- Received physical therapy (rehabilitation) or surgery after the injury occurred.

Link to the study:
[redacted]
Thank you for your help,

Zainab Sanni
[redacted]

Appendix H: Information Statement

Welcome to the Sport Psychology Survey!

We really appreciate your willingness to complete this survey. The University of Kansas requires us to provide participants with detailed information about the study. Please see the information statement on the following page. At the end of the information statement, you can hit the next arrow to proceed directly to the survey.

Information Statement:

The Department of Health, Sport & Exercise Science at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

We are conducting this study to better understand collegiate athletes' resiliency, as well as their perceptions about their rehabilitation process. This will entail your completion of a survey. Your participation is expected to take approximately 20 minutes to complete. The content of the survey should cause no more discomfort than you would experience in your everyday life. It is possible, however, with internet communications, that through intent or accident someone other than the intended recipient may see your response.

Although participation may not benefit you directly, we believe that the information obtained from this study will help us again a better understanding of how coaches, physical therapist, and athletic trainers can create a positive environment that facilitates athletes' engagement in their rehabilitation processes and feel good about their ability to overcome an injury. Your participation in the study is voluntary and anonymous. No identifying information is being collected.

If you would like additional information concerning this study before or after it is completed, please feel free to contact us by phone or email. Completion of the survey indicates your willingness to take part in this study and that you are at least 18 years old. If you have any additional questions about your rights as a research participant, you may call (785) 864-7429 or write the Human Research Protection Program, University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, email irb@ku.edu.

Sincerely,
Zainab Sanni
Principal Investigator
[redacted]
Mary D. Fry, PhD [redacted]
Director, KU Sport & Exercise Psychology Lab
Dept of Health, Sport & Exercise Science
1301 Sunnyside Ave/Robinson 161
University of Kansas
Lawrence, KS 66045

Last Question format: Thank you for completing this survey!