

Keeping Your Head in the Game: Sport-Specific Imagery and Anxiety Among Injured Athletes

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Context: The use of sport-specific imagery during rehabilitation is sparse. Athletes who used imagery (either facilitative or debilitating) during injury rehabilitation were compared with injured athletes who did not use imagery. Return-to-practice anxiety in the groups was investigated also.

Objective: To (1) explore debilitating images used during rehabilitation, (2) examine athlete and injury characteristics in relation to variations in imagery content and return-to-practice anxiety, (3) compare the frequency of imagery use early in injury rehabilitation with that just before return to practice, and (4) examine the relationship between image use and return-to-practice anxiety.

Design: Observational design.

Setting: Athletic training facilities.

Patients or Other Participants: Thirty-six injured National Collegiate Athletic Association Division I collegiate athletes sustaining at least an 8-day practice suspension due to injury.

Main Outcome Measure(s): Sport Imagery Questionnaire, Sport Anxiety Scale.

Results: Athletes used both facilitative and debilitating images during different phases of rehabilitation. Men used more

sport skill, strategy, and excitement imagery content than did women, who reported higher scores for worry and concentration disruption than did men. Athletes used fewer images related to their sport skills and strategies early in rehabilitation than just before they returned to practice. Additionally, athletes who used more arousal and less strategic imagery experienced more somatic anxiety.

Conclusions: Similar to research findings on healthy athletes, sport-specific image content in injured athletes is related to return-to-practice anxiety during rehabilitation, and some of the images were perceived as debilitating. Practitioners should advise injured athletes to use sport-specific imagery, especially that related to sport skills and strategies, but they should caution athletes against using arousal imagery, because it may elevate somatic anxiety before return to practice. Image content recommendations should encompass the cognitive and motivational functions of imagery, and the practitioner should assess if any image used by the athlete is debilitating.

Key Words: sport psychology, psychology, injury rehabilitation, return to play

Key Points

- Although untrained in imagery, most of the injured athletes used some type of imagery while undergoing rehabilitation; yet some of the images were perceived as debilitating.
- The longer athletes were injured, the less likely they were to use imagery and the more likely to experience somatic anxiety.
- Men used more imagery than women, especially in early rehabilitation. Women experienced more worry and concentration disruption than men.

Aligned with the 2006 National Athletic Trainers' Association (NATA) Educational Competencies,¹ imagery and other motivational techniques are included as part of the psychomotor competencies and clinical proficiencies for students in accredited athletic training education programs. Specifically, cognitive competencies and proficiencies under the "Psychosocial Intervention and Referral" domain state that athletic trainers will "[d]escribe the basic principles of mental preparation, relaxation, visualization, and desensitization techniques" and "[s]elect and integrate appropriate motivational techniques (verbal motivation, visualization and imagery) into a patient's treatment or rehabilitation program."^{1(p 39)} Prentice² and Walsh³ advocated that certified athletic trainers (ATs) employ imagery to help athletes positively respond to their injuries and facilitate recovery. However, sport-specific imagery content prescriptions or what to image for facilitating return to play is rarely described in any rehabilitation

context. Rather, the focus of imagery content seems to be on healing, pain management, and general performance imagery.^{4,5}

Although studies of imagery content related to rehabilitation exercises and healing are quite common, sport-specific imagery focusing on maintaining sport skills, facilitative arousal levels among injured athletes, strategies, and sport-specific goals has been virtually ignored, despite an applied model of mental imagery advocated by Martin et al.⁶ This model suggests that positive outcomes, such as confidence, are achievable through the use of sport-specific imagery in rehabilitation settings.

The theoretical basis of the applied model of mental imagery⁶ lies in the Paivio⁷ taxonomy for classifying image content into cognitive and motivational functions. Based on that taxonomy, Hall et al⁸ developed the Sport Imagery Questionnaire (SIQ), which measures the frequency of using 5 types of imagery that vary by content: (1) Cognitive General (CG-Strategies), (2) Cognitive Specific (CG-

Skills), (3) Motivational Specific (MS-Goals), (4) Motivational General Arousal (MG-Arousal), and (5) Motivational General Mastery (MG-Mastery). Cognitive-Specific imagery involves visualizing a specific sport skill (eg, a punt, throwing a curveball), whereas CG-Strategies imagery is the mental rehearsal of game strategies (eg, zone defense, 2-on-1 fast break). Motivational-Specific imagery is the visualization of specific, goal-oriented events or behaviors (eg, practicing 10 layups, winning a medal), whereas MG-Arousal imagery represents feelings generally associated with levels of arousal or anxiety (eg, feeling pumped up for competition). Motivational General-Mastery imagery represents effective coping or mastery of difficult situations (ie, generally being in control, self-confident, and mentally tough). The accumulation of training and competitive context research supporting the Martin et al⁶ model stipulates that desired outcomes such as anxiety reduction, self-confidence, and performance enhancement can be attained by systematically using specific images representing the 5 functions categorized by Paivio.⁷

Identifying the imagery content most conducive to meeting the needs of injured athletes includes reducing anxiety about return to practice and should be a goal in applied rehabilitation settings. Theoretically, it is reasonable to assume that injured athletes experience anxiety about returning to practice and sustaining reinjury,⁹ but studies documenting this finding are sparse. The prevalence of anxiety among athletes compared with controls has been documented immediately after physical injury and at follow-up 2 months later,¹⁰ and the intensity of anxiety seems to be similar in adolescents and adults.¹¹ Symptoms associated with anxiety include somatic responses, such as muscle tension, sweating, increased heart rate, throat constriction, and gastrointestinal dysfunction, as well as cognitive responses, such as worry, concentration disruption, apprehension, and negative images. Consider an athlete plagued by images of sport skills that resulted in becoming injured. Injured athletes may display a variety of affective responses, based on severity of injury and length of rehabilitation, as they progress through the recovery period.¹² Thus, it is reasonable to assume that these symptoms might be associated with certain images.

Borrowing from conventional measurement approaches to competitive anxiety,¹ evidence suggests that healthy athletes tend to perceive certain sport-related images (skills and strategies) as debilitating.¹³ What remains unclear is whether injured athletes engage in imagery related to their sports while injured and whether these images are perceived as debilitating. Furthermore, examining the relationship between imagery and anxiety in rehabilitation contexts is important, because in addition to being a precursor to injury, anxiety is related to reinjury and to subsequent illness.^{14,15} If, during rehabilitation, athletes are identified as anxious about returning to practice, practitioners can find the right images to help athletes focus on their sport skills, which may reduce their anxiety about returning to play.

No authors have systematically considered whether sport-specific imagery, as described in the applied model of mental imagery, is used by athletes while they are physically unable to play and whether this imagery content is related to anxiety about return to practice. In order to

design intervention studies and subsequently prescribe specific images, it makes sense to examine sport-specific imagery use over the course of the rehabilitation program and how it might relate to anxiety about return to practice. Therefore, our goals were to (1) explore the extent to which debilitating images were used during rehabilitation, (2) examine athlete and injury characteristics in relation to variations in imagery content and anxiety about return to practice, (3) compare the frequency of imagery use early in injury rehabilitation with that used just before returning to practice, and (4) examine the relationship of image use with anxiety about returning to practice.

METHODS

Participants

The participants for this study were 36 collegiate athletes (age range, 18 to 22 years; mean = 19.4 ± 1.1 years) from a southeastern National Collegiate Athletic Association Division I university. The athletes consisted of 14 men (39%) and 22 women (61%) representing baseball (n = 4), cheerleading (n = 5), swimming (n = 5), track (n = 3), volleyball (n = 3), soccer (n = 8), basketball (n = 3), equestrian (n = 1), softball (n = 2), and tennis (n = 2). Length of competitive experience ranged from 2 to 15 years (mean = 9.1 ± 4.1 years).

All athletes had an injury precluding practice and competition for at least 8 days. The rehabilitation period ranged from 10 to 345 days, with an average of 114.7 ± 89.9 days and a median of 26 days. The types of injuries represented in the sample were fractures (n = 5, 13%), overuse (n = 6, 17%), acute sprains and strains (n = 6, 17%), and injuries treated surgically (n = 19, 53%).

Instrumentation

Demographics Form. In addition to indicating age, sex, primary sport, injury type, injury location, and competitive level, athletes used a 7-point Likert scale (1 = *low*, 7 = *high*) to report their years of specific sport experience, imagery training, perceived injury severity, confidence in their ability to adhere to the rehabilitation program, and confidence in returning to their previous sport ability.

Sport Imagery Questionnaire. The Sport Imagery Questionnaire (SIQ) is a 30-item questionnaire that assesses the frequency of using images reflected in the Paivio⁷ cognitive and motivational functions of imagery. It comprises 5 subscales: sport skills (CS-Skills: “I can consistently control the image of a physical skill”), strategies and tactics (CS-Strategies: “I image each section of an event/game” [eg, offense versus defense, fast versus slow]), goal-related outcomes (MS-Goals: “I image the audience applauding my performance”), arousal (MG-Arousal: “I can recreate in my head the emotions I feel before I compete”), and mastery (MG-Mastery: “I imagine being mentally tough”). The SIQ was modified in accordance with Short et al.¹⁶ That is, in addition to asking participants to respond to the scale regarding frequency of imagery use, where 1 = *low* and 7 = *high*, we also asked participants to rate each item as being helpful or harmful. Hall et al⁸ conducted exploratory and confirmatory factor analysis, to support the 5-factor structure. The internal consistency coefficients for the SIQ subscales (Table 1) in

Table 1. Descriptive Statistics

Time, Test, and Subscale	Sport Imagery Questionnaire Frequency		
	Mean	SD	α
Time 1			
Sport Imagery Questionnaire			
CS-Skills	27.4	9.1	.87
CG-Strategies	27.5	7.8	.75
MS-Goals	28.3	6.5	.63
MG-Mastery	33.0	8.1	.91
MG-Arousal	26.7	8.9	.85
Time 2			
Sport Imagery Questionnaire			
CS-Skills	28.4	7.6	.78
CG-Strategies	27.5	7.0	.77
MS-Goals	27.5	8.1	.85
MG-Mastery	31.5	8.4	.90
MG-Arousal	28.0	7.2	.81
Sport Anxiety Scale			
Somatic anxiety	17.4	5.9	.87
Worry	13.0	5.2	.91
Concentration disruption	8.1	3.2	.70

Abbreviations: CG, Cognitive General; CS, Cognitive Specific; MG, Motivational General; MS, Motivational Specific.

this sample ranged from 0.63 to 0.91 for time 1 and 0.77 to 0.90 for time 2.

Sport Anxiety Scale. The Sport Anxiety Scale (SAS)¹⁷ is a 21-item measure of multidimensional trait anxiety that assesses somatic anxiety (9 items), worry (7 items), and concentration disruption (5 items). A 4-point Likert scale measures reactions to competition (1 = *not at all*, 2 = *somewhat*, 3 = *moderately*, and 4 = *very much so*). Rather than instructing athletes to respond to the items in general, we instructed athletes to respond as if they were returning to play instead of competing. The SAS has been used on a variety of populations across several sports and skill levels, showing adequate internal consistency and convergent and divergent validity.¹⁷ The internal consistencies in the present sample were 0.87 for somatic anxiety, 0.91 for worry, and 0.70 for concentration disruption.

Injury Description Form. The participants' ATs described their athletes' injuries, including injury type, severity, location, status (chronic versus acute), injury date, number of days in rehabilitation, and expected days away from practice. The ATs also reported their own perceptions of their athletes' injury severity on a 7-point Likert scale (1 = *low*, 7 = *severe*).

Feelings About Returning to Practice or Competition Form. This form ascertained (1) whether the athlete was returning to practice or competition after completing the last surveys (ie, SIQ, SAS, and Injury Description Form), (2) whether he or she used imagery while injured, and if so, how often (daily or weekly), and (3) the athlete's confidence about returning to practice, as rated on a 7-point Likert scale (1 = *low confident* [sic], 7 = *extreme confident* [sic]).

Procedures

After we obtained approval by the institutional review board, consenting ATs recruited participants at their

university athletic training rooms. The ATs were provided training by the primary investigator (E.M.) during a 1-hour workshop immediately after a recruitment meeting. Athletes with an injury precluding at least 8 days of practice were recruited. Our rationale was that athletes who missed 8 or more days likely had sustained an injury that would preclude practice for much longer, when it might be important to use imagery to maintain one's physical skills and strategies. This time frame also was used in previous research⁵ conducted in Canada and verified by head athletic ATs at 2 US universities.

Once the supervising AT identified a potential volunteer, the AT or a member of the research team solicited participation. Upon acquiring informed consent from the athlete or guardian (or both), we collected time 1 data as near to the date of injury as possible. This included the demographic information form and the SIQ. Time 2 data included a second administration of the SIQ, the Feelings About Returning to Practice or Competition Form, and the SAS as near to the time of actual return to practice as possible. Completing each questionnaire packet took approximately 15 minutes.

The supervising AT was responsible for collecting all data and keeping track of the athlete's file until the time 1 and time 2 packages were both complete, at which point the athlete's file was turned over to a member of the research team. Of approximately 48 athletes invited to participate in this study, 30 completed both time 1 and time 2 questionnaires, and 6 completed time 1 questionnaires only (response rate = 75% for time 1 data only and 63% for time 1 and time 2 data). Attrition-related missing time 2 data for 6 of the 36 participants were imputed with the injury-type group mean for time 2 variables.¹⁸

Data Analysis

Frequency analyses were conducted on the SIQ at the item level to determine whether injured athletes perceived SIQ imagery content as debilitating. We used multiple analyses of variance procedures to examine SIQ and SAS variations across various demographic and background variables, including sex, sport type, injury type, injury location, and importance of injury location to the sport. Correlation analyses were performed among injury-related variables that were continuous (days in rehabilitation, rehabilitation length, rehabilitation adherence efficacy, preinjury ability efficacy, injury severity as perceived by ATs). We used repeated-measures multiple analyses of covariance to compare imagery content used early in the rehabilitation process with that used just before the return to practice. Quasi-hierarchical regression analysis was calculated to determine whether the SIQ subscales predicted anxiety symptoms measured by the SAS.

RESULTS

Descriptive Statistics

All athletes reported that they were returning to practice rather than competition after completing their surveys, and none reported formal imagery training. Of the 25 participants (69%) responding to the questions on the Feelings About Returning to Practice or Competition Form, the majority reported using imagery ($n = 17$, 68%);

Table 2. Correlation Analyses Between Injury-Related Variables and the Sport Imagery Questionnaire and Sport Anxiety Scale Subscales

Time, Test, and Subscale	Days in Rehabilitation	Experience	Adherence Efficacy	Previous Ability Efficacy	Severity as Perceived by Athletic Trainer
Time 1					
Sport Imagery Questionnaire					
CS-Skills	-0.40	0.06	0.24	0.44 ^a	0.07
CG-Strategies	-0.55 ^b	-0.10	0.23	0.35 ^b	-0.12
MS-Goals	-0.39	-0.15	0.14	0.10	0.04
MG-Mastery	-0.16	0.06	0.05	0.16	0.19
MG-Arousal	-0.57 ^b	-0.19	0.32	0.25	-0.03
Time 2					
Sport Imagery Questionnaire					
CS-Skills	-0.62 ^a	-0.06	-0.14	0.16	-0.09
CG-Strategies	-0.61 ^a	-0.12	-0.16	0.11	-0.24
MS-Goals	-0.46	-0.02	0.07	-0.16	-0.35
MG-Mastery	-0.31	0.04	-0.22	0.12	0.25
MG-Arousal	-0.62 ^a	-0.07	-0.02	0.09	-0.13
Sport Anxiety Scale					
Worry	0.01	0.15	0.07	-0.21	0.20
Concentration disruption	0.20	0.25	0.01	-0.06	0.39 ^b
Somatic anxiety	0.41 ^b	0.10	0.02	-0.37 ^b	0.14

Abbreviations: CG, Cognitive General; CS, Cognitive Specific; MG, Motivational General; MS, Motivational Specific.

^a $P < .01$.

^b $P < .05$.

7 (28%) indicated they used it weekly and 10 (40%) indicated they used it daily. Means, SDs, and Cronbach α coefficients on the instruments for the entire sample ($n = 36$) are presented in Table 1.

The majority of SIQ items were perceived as facilitative at time 1 (27/30, 90%) and time 2 (25/30, 83%). At time 1, MG-Arousal items 4 (“In my head, I can recreate the emotions I feel before I compete”), 15 (“I image the anxiety associated with competing”), and 22 (“When I image a game or event that I am to participate in, I feel anxious”) and at time 2, CS-Skills item 11 (“I can easily change the image of a skill”), CG-Strategies item 16 (“I image continuing with my game or event plan even when performing poorly”), and MG-Arousal items 15, 17 (“When I image a competition, I get emotionally excited”), and 22 were thought to be harmful to performance by at least 25% ($n = 9$) of the sample. Although the athletes perceived half of MG-Arousal items as debilitating, item means were greater than the midpoint of the scale (3.0), indicating frequent use of debilitating images (means range, 3.7 to 5.4).

Time 1 responses to the SIQ varied by sex (Wilks $\Lambda = 0.70$, $F_{5,30} = 2.61$, $P < .05$, $\eta^2 = .20$). Univariate statistics were significant for CS-Skills ($F_{1,34} = 13.99$, $P = .001$, $\eta^2 = .29$), CG-Strategies ($F_{1,34} = 7.50$, $P = .01$, $\eta^2 = .18$), and MG-Arousal ($F_{1,34} = 6.67$, $P < .05$, $\eta^2 = .14$). For each of the subscales, men (CS-Skills mean = 31.5 ± 7.5 , CG-Strategies mean = 30.5 ± 5.7 , MG-Arousal mean = 36.5 ± 5.7) reported higher scores than women (CS-Skills mean = 24.6 ± 9.6 , CG-Strategies mean = 25.4 ± 8.0 , MG-Arousal mean = 30.8 ± 8.8). The variation by sex in SAS scores was also significant (Wilks $\Lambda = 0.75$, $F_{3,32} = 2.76$, $P = .05$, $\eta^2 = .23$). Univariate statistics were significant for worry ($F_{1,34} = 6.05$, $P < .05$, $\eta^2 = .17$) and concentration disruption ($F_{1,34} = 4.21$, $P < .05$, $\eta^2 = .13$). Men (worry mean = 10.2 ± 3.0 , concentration disruption mean = 6.6 ± 2.3) reported lower scores than women (worry mean =

14.6 ± 5.5 , concentration disruption mean = 9.0 ± 3.3). No other comparisons on athlete or injury characteristics were significant ($P > .05$).

Bivariate correlations between injury-related variables and the SIQ and SAS are presented in Table 2. All correlations involving days in rehabilitation were negative, and those correlations that were significant ($P < .05$; CG-Strategies and MG-Arousal imagery used early in rehabilitation, CS-Skills, CG-Strategies, and MG-Arousal imagery used just before returning to practice) were moderate, ranging from -0.55 to -0.62 . The moderate positive correlation between days in rehabilitation and somatic anxiety was also significant. In general, athletes who had been injured longer experienced more somatic anxiety and used less imagery.

Both cognitive functions of imagery (CG-Strategies and CS-Skills) used early in the rehabilitation program were significantly and moderately correlated with previous ability efficacy. The moderate correlation between previous ability efficacy and somatic anxiety was negative, whereas the correlation between injury severity as perceived by the AT and concentration disruption was positive. None of the results on the SIQ or SAS subscales correlated with years of experience or adherence efficacy ($P > .05$), but there was a trend toward a positive correlation between imagery and injury-related variables at time 1 and a negative correlation at time 2. Due to the significant correlations from this analysis, we controlled for injury-related variables in the subsequent regression analyses.

Imagery Use Over the Course of Injury

Days injured did not affect whether imagery content was used in the rehabilitation program ($P > .05$). However, a significant main effect was noted for time (Wilks $\Lambda = 0.92$, $F_{5,29} = 3.97$, $P = .05$). Univariate analyses were significant for both cognitive functions of imagery; participants used more CS-Skills and CG-Strategies early in rehabilitation

Table 3. Descriptive Statistics for the Repeated-Measures Analysis of Covariance Controlling for Previous Ability Efficacy

Subscale	Time 1		Time 2		<i>F</i>	η^2
	Adjusted Mean	Standard Error	Adjusted Mean	Standard Error		
CG-Strategies	27.50	1.28	27.39	1.06	6.95 ^a	0.17
CS-Skills	27.38	1.49	28.30	1.16	9.02 ^b	0.21
MS-Goals	26.72	1.43	28.00	1.10	2.80	0.08
MG-Mastery	28.27	1.10	26.61	1.21	3.41	0.09
MG-Arousal	33.03	1.36	31.61	1.28	1.46	0.04

Abbreviations: CG, Cognitive General; CS, Cognitive Specific; MG, Motivational General; MS, Motivational Specific.

^a $P < .05$.

^b $P < .01$.

than before returning to practice (Table 3). Effect sizes were low to moderate (<0.25).¹⁸

Relationship Between Imagery and Anxiety

Injury characteristics correlating with SAS subscales or those correlating with several SIQ subscales were forced into equations at step 1 (Table 4), followed by stepwise analyses of the SIQ predictors. Imagery used early in rehabilitation (time 1) and just before returning to practice (time 2) was examined separately.

At time 1, previous ability efficacy and MG-Arousal predicted somatic anxiety ($F_{3,33} = 3.09$, $P = .05$), explaining 27% of the total variance. Days injured did not contribute to the relationship. The valence of standardized β weights indicated that lower somatic anxiety scores were associated with higher efficacy scores. After we controlled for days injured, CG-Strategies was a predictor of worry ($F_{2,34} = 5.04$, $P < .05$), explaining 16% of the variance. Participants who used more CG-Strategies had lower scores for this SAS subscale.

At time 2, MG-Mastery predicted somatic anxiety once days injured and previous ability efficacy were controlled ($F_{3,33} = 3.04$, $P < .05$), explaining 26% of the total variance. The MG-Mastery subscale was associated with

lower somatic anxiety scores, and it also predicted worry after days injured were controlled ($F_{3,33} = 2.99$, $P = .05$), explaining 25% of the total variance. Participants using more MG-Mastery had higher worry scores.

DISCUSSION

A critical role of ATs in the rehabilitation of athletes is their ability to instruct patients in home exercises. Investigating how athletes use sport-specific imagery and the feelings associated with image content can help professionals, including ATs, make recommendations as to what to image while athletes are unable to play. In this longitudinal study, we embarked on identifying to what extent injured athletes used sport-specific images during the course of their rehabilitation, which ranged from 10 days to 12 months. We also considered whether these images were debilitating (harmful to performance) as well as the relationship of imagery with return-to-play anxiety.

Factors Related to Imagery Use and Anxiety

The longer athletes were injured, the less imagery they used, as is apparent from the negative correlations between days injured and the SIQ subscales. However, most

Table 4. Summary of Separate Hierarchical Regression Analyses Predicting Sport Anxiety Scale Subscale Values From Time 1 and Time 2 Sport Imagery Questionnaire Subscale Scores

Time, Imagery, Sport Anxiety Scale Subscale, Sport Imagery Questionnaire Subscale	<i>R</i>	<i>R</i> ²	Adjusted <i>R</i>	Increment	Standard β	<i>t</i>
Time 1						
Early rehabilitation imagery						
Somatic anxiety						
Days in rehabilitation	0.01	0.00	0.00	0.00	0.16	0.61
Previous ability efficacy	0.42	0.17	0.12	0.17	-0.45	-2.06 ^a
MG-Arousal	0.63	0.40	0.27	0.20	0.54	2.17 ^a
Worry						
Days in rehabilitation	0.12	0.01	0.02	0.02	0.13	0.74
CG-Strategies	0.42	0.18	0.11	0.16	-0.40	-2.25 ^a
Time 2						
Return to practice imagery						
Somatic anxiety						
Days in rehabilitation	0.01	0.00	0.00	0.02	0.08	0.08
Previous ability efficacy	0.44	0.17	0.12	0.17	-0.25	-1.13
MG-Mastery	0.67	0.45	0.33	0.26	0.57	2.55 ^a
Worry						
Days in rehabilitation	0.20	0.04	-0.04	0.04	0.35	1.55
MG-Mastery	0.53	0.29	0.19	0.25	0.52	2.78 ^a

Abbreviations: CG, Cognitive General; CS, Cognitive Specific; MG, Motivational General; MS, Motivational Specific.

^a $P < .05$.

respondents (68%) reported using some type of imagery throughout the course of their rehabilitation. Based on the magnitude of SIQ subscale means, item frequency, and direction analyses, this sample of collegiate athletes used all 5 functions of imagery and used each of the 6 images specified by the 5 subscales to some extent.

In some cases, these images were perceived as debilitating but were used anyway, as indicated by scores higher than the scale midpoint (3 = *sometimes*). In particular, debilitating images included those involving emotions associated with precompetition (ie, “When I image a competition, I get emotionally excited”) and recreating precompetition emotions. It is surprising that athletes who could “change the image of a skill” and image “continuing with a game or event plan even when performing poorly” (cognitive content) also reported that these images were debilitating. Because these latter 2 images can potentially empower athletes to stay mentally tough, those reporting that these images were debilitating might have been imaging skills or games during which the actual injury occurred. As noted with previous research on healthy competitive athletes,¹⁶ imagery training for practitioners delivering interventions should include verification that the images suggested or used by athletes are not perceived as debilitating.

Fear of reinjury and anxiety about the unknown and letting down teammates or coaches are documented return-to-competition emotions.¹⁹ Imagery of previous experiences, together with MG-Arousal images, has been shown to predict cognitive anxiety.²⁰ The present findings support the idea of familiarizing practitioners with the Paivio⁷ taxonomy of imagery content, so they can determine the extent to which specific images are being used and whether these images have an anxiety-provoking/debilitating effect on the athlete. If so, cognitive restructuring of debilitating images could be advocated under the guidance of a trained professional.

Compared with women, men used more cognitive imagery associated with both skills (CS-Skills) and strategies (CG-Strategies) as well as imagery associated with excitement (MG-Arousal) early in the rehabilitation program. This finding is unique; a review²¹ of similar imagery research did not demonstrate differences in image content between injured⁵ and healthy athletes.^{20,22} However, in one exception,²³ healthy males used more images of strategies and goals than did females. In our investigation, men reported less worry and concentration disruption than women did, but the effect sizes were small. Overall, these findings support the idea that interventions geared at reducing anxiety through imagery should be tailored by sex. More work to test the effectiveness of interventions by sex and involving the use of specific images reflecting the Paivio⁷ cognitive and motivational functions is warranted. The present findings extend the SAS literature: We are the first to consider the SAS items in the context of injury rehabilitation. Maintaining the item stems and changing the context to fit the rehabilitation setting yielded adequate internal consistency values (>0.70) and descriptive statistics consistent with the original SAS.¹⁷

Somatic anxiety was positively related to days injured, indicating that the longer an athlete was injured, the more he or she reported feeling physiologic responses of anxiety associated with returning to practice. However, unlike previous researchers,^{5,18} who found positive relationships

between rehabilitation efficacy and rehabilitation-related imagery use, we noted no correlations between rehabilitation efficacy and anxiety or sport-specific imagery use. Imagery content might help to explain the discrepancy between findings. To date, the image content of most studies has focused only on rehabilitation exercises and pain management. If sport performance was considered, it was in a general sense rather than the breadth of images included in the SIQ.³ More research concerning the use of sport-specific imagery is needed on larger, more diverse samples.

Imagery Use Over the Course of Injury

Overall, the longer athletes were injured, the less likely they were to use imagery. More specifically, athletes who did not use CG-Strategies and MG-Arousal imagery early in rehabilitation and those who did not use CS-Skills, CG-Strategies, or MG-Arousal just before returning to practice spent more time away from practice. It is also interesting to note that somatic anxiety was associated with increased rehabilitation time, but athletes who spent time imaging skills and strategies were more efficacious in returning to their previous ability levels. Moreover, athletes who were more confident in returning to their previous ability levels reported less somatic anxiety. Together with the body of healing-imagery literature,³ these findings indicate that imaging sport skills and strategies can help athletes “keep their heads in the game,” or maintain sport focus, and perhaps minimize their somatic anxiety.

It is interesting that the athletes’ concentration disruption was higher if their ATs perceived their injury as more severe. From a practical standpoint, when incorporating functional progression into a rehabilitation program, clinicians should help build confidence in an effort to maximize the concentration required for return to practice. In all settings (high school, collegiate, professional, and sports medicine clinics), ATs can specifically enhance rehabilitation programs during the functional return-to-play phase.

After accounting for variations in athletes’ confidence about returning to their previous ability, it was apparent that injured athletes indeed used CS-Skills and CG-Strategies more before returning to practice than earlier in the rehabilitation process. No differences were noted in motivational imagery content (imagery related to goals, excitement, or mastery), but athletes who did not use CG-Strategies worried more about returning to play. It is possible that injured athletes may not know to use images of strategies or motivational imagery related to practice or competition and may need guidance as to how this content can be used to set performance-related goals, achieve confidence, and control anxiety, especially as return to practice approaches. Previous researchers have shown these relationships in competitive contexts^{20,22} and in association with healing imagery.^{5,24–26}

Relationships Between Imagery and Anxiety

Despite the wide range of rehabilitation days represented in the sample, it was surprising that rehabilitation days did not predict anxiety about return to practice. We would expect that the longer an athlete was injured, the more anxious he or she would feel about returning to play.

Rather, imagery use and confidence in returning to one's previous ability were more important in predicting anxiety about return to play than days of rehabilitation. Considering the role of rehabilitation length and previous confidence in one's ability in other contexts, such as recreational athletics or occupational injury rehabilitation, would be helpful, because the level of importance of returning to play may vary across these settings, possibly moderating relationships between imagery and anxiety.

The MG-Arousal (eg, images associated with the anxiety and excitement of participating in sport) used early in the rehabilitation process explained 20% of the variance in somatic anxiety; the more athletes used this imagery content, the more somatic anxiety they experienced. Positive relationships between this content and somatic anxiety have been shown previously among dancers²⁷ and athletes.²⁰ Although athletes generally find moderate levels of somatic anxiety important when preparing for competition,²⁸ this finding is worrisome, because a large number of athletes in this sample perceived many of the images representing the MG-Arousal function as debilitating. In contrast, the use of MG-Mastery just before returning to practice was related to heightened somatic anxiety and worry, which was also surprising because this type of imagery is most often associated with confidence. Thus, clinicians should caution athletes against using MG-Arousal imagery content if somatic anxiety also is perceived as debilitating and perhaps instead emphasize images related to sport skills, strategies, and goals as they prepare for return to practice. Anxiety management techniques should correspond with symptoms, so with somatically anxious athletes, practitioners should use relaxation strategies rather than cognition-based strategies.²⁴

This longitudinal examination of sport-specific imagery content used by athletes during injury rehabilitation can be considered prototypical imagery use, because no imagery prescriptions were made during rehabilitation. We conclude that these injured athletes indeed used sport-specific imagery without intervention while they were injured. Thus, one role of practitioners is to determine whether athletes are aware of the broad range of image content, such as that categorized in the SIQ, and whether any of the images they are using are perceived as debilitating. Previous research indicates that injured athletes report being encouraged to analyze their sport from the sidelines.¹⁹ To make the best use of athletes' time while unable to participate, practitioners can play an important role in helping injured athletes "keep their heads in the game" by suggesting the use of various images representing cognitive and motivational functions. None of our participants described having formal imagery training, so their reports are indications of what occurs naturally in this sample. Relationships between image content and anxiety and debilitating functions of certain images in the present sample, which was heterogeneous by injury and sport type, are similar to previous findings on athletes representing a variety of sports^{6,16} and dancers.²⁹ Following the applied model of mental imagery, the next step in researching rehabilitation contexts would be to test the effectiveness of sport-specific images on more homogeneous samples. Infusing imagery into rehabilitation has long been advocated in the allied health professions,³⁰ but given the theory-driven extension of research emerging on image content, practical applications should be kept in mind. If athletic training education programs continue requiring imagery in their skills

set, future investigators should consider what ATs know, practice, and feel comfortable using.

CONCLUSIONS

Although these injured athletes reported no training in imagery, most used some type of imagery while unable to play; however, some of the image content was perceived as debilitating. The longer athletes were injured, the less likely they were to use imagery and the more likely they were to experience somatic anxiety in particular. Men used more imagery, especially in the earlier stages of their rehabilitation. The use of sport-specific image content reflected in the Paivio⁷ cognitive and motivational functions of imagery, in addition to those related to healing and rehabilitation, is advocated by practitioners. Yet it is important to identify images perceived as debilitating by individuals, because images reflecting a motivational function may be associated with anxiety.

REFERENCES

1. National Athletic Trainers' Association. *Athletic Training Educational Competencies*. 4th ed. Dallas, TX: National Athletic Trainers' Association; 2006:35–36.
2. Prentice WE. *Arnheim's Principle of Athletic Training: A Competency-Based Approach*. 12th ed. New York, NY: McGraw-Hill; 2006: 312–313.
3. Walsh M. Injury rehabilitation and imagery. In: Morris T, Spittle M, Watts A, eds. *Imagery in Sport*. Champaign, IL: Human Kinetics; 2005:267–283.
4. Jones L, Stuth G. The uses of mental imagery in athletics: an overview. *J Appl Prevent Psychol*. 1997;6(2):101–115.
5. Sordoni C, Hall C, Forwell L. The use of imagery in injury rehabilitation and its relationship with self-efficacy. *Physiother Canada*. 2002;54:177–185.
6. Martin KM, Moritz S, Hall C. Imagery use in sport: a literature review and applied model. *Sport Psychol*. 1999;13(3):245–268.
7. Paivio A. Cognitive and motivational functions of imagery in human performance. *Can J Appl Sport Sci*. 1985;10(4):22S–28S.
8. Hall CR, Mack D, Paivio A, Hausenblas H. Imagery use by athletes: development of the Sport Imagery Questionnaire. *Intl J Sport Psychol*. 1998;29(1):73–89.
9. Wiese-Bjornstal DM, Smith AM, Schaffer SM, Morrey MA. An integrated model of response to sport injury: psychological and sociological dynamics. *J Appl Sport Psychol*. 1998;10(1):46–69.
10. Leddy MH, Lambert MJ, Ogles BM. Psychological consequences among high-level competitors. *Res Q Exerc Sport*. 1994;65(4):347–354.
11. Tripp DA, Stanish WD, Reardon G, Coady C, Sullivan MJL. Comparing postoperative pain experiences of adolescents and adult athletes after anterior cruciate ligament surgery. *J Athl Train*. 2003;38(2):154–157.
12. Mellalieu SD, Hanton S, Fletcher T. A competitive anxiety review: recent directions in sport psychology research. In: Hanton S, Mellalieu S, eds. *Literature Reviews in Sport Psychology*. Hauppauge, NY: Nova Science; 2006:11–56.
13. Short SE, Ross-Stewart L, Monsma EV. Onwards with the evolution of imagery research in sport psychology. *Athl Insight*. 2006;8(3):47–63.
14. Coddington R, Troxell J. The effect of emotional factors on football injury rates: a pilot study. *J Hum Stress*. 1980;6(4):3–5.
15. Kerr GA, Miden H. Psychological factors related to the occurrence of athletic injuries. *J Sport Exerc Psychol*. 1988;10(2):1–11.
16. Short S, Monsma E, Short M. Is what you see really what you get? Athletes' perceptions of imagery's functions. *Sport Psychol*. 2004; 18(3):341–349.
17. Smith RE, Smoll FL, Schutz RW. Measurements and correlates of sport-specific cognitive and somatic trait anxiety: the Sport Anxiety Scale. *Anxiety Stress Coping*. 1990;2(4):263–280.

18. Tabachnick BG, Fidell LS. *Using Multivariate Statistics*. 3rd ed. New York, NY: Harper Collins; 1996:60–65.
19. Podlog L, Eklund RC. A longitudinal investigation of competitive athletes' return to sport following serious injury. *J Appl Sport Psychol*. 2006;18(1):44–68.
20. Vadocz E, Hall C, Moritz S. The relationship between competitive anxiety and imagery use. *J Appl Sport Psychol*. 1997;9(20):241–253.
21. Hall C. Imagery in sport and exercise. In: Singer R, Hausenblas H, Janelle CM, eds. *Handbook of Sport Psychology*. 2nd ed. New York, NY: John Wiley & Sons; 2001:529–549.
22. Hall CR, Rodgers WM, Barr KA. The use of imagery by athletes in selected sports. *Sport Psychol*. 1990;4(1):1–10.
23. Weinberg R, Butt J, Knight B, Burke KL, Jackson A. The relationship between the use and effectiveness of imagery: an exploratory investigation. *J Appl Sport Psychol*. 2003;15(1):26–40.
24. Maynard IW, Smith MJ, Warwick-Evans L. The effects of a cognitive intervention strategy on competitive state anxiety and performance in semiprofessional soccer players. *J Sport Exerc Psychol*. 1995;17(4):428–446.
25. Maline M, Hall C, Forwell L. Self-efficacy, imagery use, and adherence to rehabilitation by injured athletes. *J Sport Rehabil*. 2005;14(2):150–167.
26. Evans L, Hare R, Mullen R. Imagery use during rehabilitation from injury. *J Imagery Res Sport Phys Activ*. 2006;1(1):1–19.
27. Monsma EV, Overby LY. The relationship between imagery and competitive anxiety in ballet auditions. *J Dance Med Sci*. 2004;8(1):11–18.
28. Hedgpeth EG, Gieck J. Psychological considerations for rehabilitation of the injured athlete. In: Prentice WE, ed. *Rehabilitation Techniques for Sports Medicine and Athletic Training*. 4th ed. New York, NY: McGraw-Hill; 2004:40–59.
29. Green LB. The use of imagery in the rehabilitation of injured athletes. *Sport Psychol*. 1992;6(4):416–428.
30. Richardson PA, Latuda LM. Therapeutic imagery and athletic injuries. *J Athl Train*. 1995;30(1):10–12.

Eva Monsma, PhD, contributed to conception and design; acquisition and analysis and interpretation of the data; and drafting, critical revision, and final approval of the article. James Mensch, PhD, ATC, contributed to conception and design; analysis and interpretation of the data; and drafting, critical revision, and final approval of the article. Jennifer Farroll, MS, ATC, contributed to conception and design; acquisition and analysis and interpretation of the data; and drafting and final approval of the article.

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