The present study explored the perceived affect of personal and situational variables, perception of pain, and imagery ability on the function and outcome of an Olympic athlete’s use of imagery. To gain an in-depth understanding of these factors, semi-structured interviews were conducted across three phases of injury rehabilitation, and return to competition. The athlete also completed the Athletic Injury Imagery Questionnaire-2 (Sordoni, Hall, & Forwell, 2002), the Vividness of Movement Imagery Questionnaire-2 (Roberts, Callow, Markland, Hardy, & Bringer, 2008), and the Visual Analogue Scale for pain (Huskisson, 1974). Findings highlight the perceived affects of personal and situational variables and imagery ability on the athlete’s responses to injury and function of imagery use. Further, this usage was perceived by the athlete to affect outcome depending on the phase of rehabilitation. Interestingly, perception of pain was not considered by the athlete to influence imagery use, this might have been due to the low pain rating reported.

Martin, Moritz and Hall (1999) developed an applied model of imagery use that identified four imagery use variables. Specifically, the model incorporated Paivio’s (1985) categorization of the functions of imagery, which relates to whether imagery has a cognitive or motivational function and if this function operates at a general or specific level; the sport situation (i.e., whether imagery is used in practice, competition or rehabilitation); imagery ability (a moderator of imagery effectiveness); and the outcomes associated with imagery use (e.g., improved performance).

A number of researchers (e.g., Callow, Hardy, & Hall, 2001; Cumming & Hall, 2002; Short, Monsma, & Short, 2004) have explored the cognitive and motivational functions of imagery detailed in the model; namely, cognitive general imagery (CG; e.g., imaging strategies), cognitive specific imagery (CS; e.g., imaging the execution of motor skills), motivation general-arousal imagery (MG-A;
e.g., imagery associated with arousal and emotions), motivation general-mastery imagery (MG-M; e.g., imaging being in control of the situation, mentally tough and confident), and motivation specific imagery (MS; e.g., imagining a goal oriented activity). However in relation to the situation, the majority of this research has examined the use of these imagery functions in training and competition at the expense of other situations such as rehabilitation (cf. Sordoni, Hall, & Forwell, 2000). This is somewhat surprising given that injured athletes have reported the efficacy of a number of psychological strategies, including imagery, in their effort to cope with the various stressors associated with injury rehabilitation (cf. Cupal, 1998; Evans, Hardy, & Fleming, 2000; Gould, Udry, Bridges, & Beck, 1997).

Within the research conducted in a rehabilitation situation, evidence highlights the use of the cognitive, motivational, healing and pain management functions of imagery. Specifically, using the Athletic Injury Imagery Questionnaire (AIIQ), Sordoni et al. (2000) found injured athletes reported using cognitive and motivational imagery in rehabilitation, although to a lesser extent than in training and competition. In a subsequent study, Sordoni, Hall, and Forwell (2002) used a revised 11-item instrument (AIIQ-2) to examine healing imagery in addition to motivational and cognitive imagery. Results indicated that athletes used all three types of imagery to about the same extent. However, contrary to Sordoni et al.’s (2002) results, Milne, Hall, and Forwell (2005) found athletes reported using more motivational and cognitive imagery than healing imagery. The inconsistency in these findings could be attributed to two possible reasons. First, situational and individual changes implicit in injury response were not taken into account (cf. Evans, Hare, & Mullen, 2006) and second due to limitations in the AIIQ and AIIQ-2 (cf. Driediger, Hall, & Callow, 2006).

With regard to the first reason, Wiese-Bjornstal, Smith, Shaffer, and Morrey (1998) proposed a stress-based cognitive appraisal model that suggested athletes’ responses to injury are influenced by pre- and post-injury factors. Pre-injury factors include personality, history of stressors, and coping resources. Post-injury factors include personal (e.g., self-perceptions, injury history, injury severity, recovery status, coping skills) and situational variables (e.g., type and level of sport). The model posits that the interaction between personal and situational variables and the process of cognitive appraisal is continuous throughout rehabilitation, and therefore not only affects athletes’ psychological responses, but also brings about changes in these responses over time (Wiese-Bjornstal et al., 1998). Indeed, consistent with Wiese-Bjornstal et al.’s model, research indicates that different phases of an athlete’s rehabilitation are characterized by different sources of stress (e.g., in the early phase, loss and disruption of normal functioning, the inability to train, and isolation, and during the return to competition fear of re-injury). Through an ongoing process of appraisal these stressors influence athletes’ cognitive, emotional and behavioral response; or what Martin et al. (1999) categorize as outcome (cf. Bianco, Malo, & Orlick, 1999; Gould et al., 1997; Johnston & Carroll, 1998).

In an attempt to account for the change implicit within models of response and the potential affect of personal and situational variables on athletes’ responses and imagery use, Evans et al. (2006) used a qualitative approach to explore athletes’ use of imagery at three different phases of rehabilitation; early, mid, and late. The results of the study highlighted the change in imagery use across the
phases of injury, and the influence of individual and situational factors and the associated stressors on cognitive, emotional and behavioral outcomes (responses). For example, during the early phase of injury, in response to intense feelings of depression and frustration, loss of confidence and high levels of pain, athletes used imagery for healing and pain management purposes, and to rehearse and maintain skills. This use of imagery was reported by athletes to enhance their self confidence. In the mid phase, athletes generally stated increased levels of pain, concerns over their inability to train, loss of physical and technical fitness, loss of confidence and a lack of progress. During this phase athletes reported increased use of healing and pain management, and CS imagery, which they felt enhanced their motivation to rehabilitate and return to sport. In the final phase, imagery was purely performance based, with athletes primarily using CS and to a lesser extent CG imagery to help them overcome fears of re-injury, maintain performance skills, and cope with concerns associated with their return to competitive sport; which they reported enhanced self-confidence.

Although Evans et al. (2006) provided evidence of changes in imagery use and function across the rehabilitation process, the study had a number of limitations. First, the return to competition phase of recovery was not explored. The importance of this phase is reinforced by the role that psychological factors play in determining the readiness of athletes to return to competitive sport (Podlog & Eklund, 2006). Second, athletes’ perception of pain was not measured. Significantly injured athletes have reported using imagery specifically for pain management purposes (e.g., Driediger et al., 2006; Evans et al., 2006; Law, Driediger, Hall, & Forwell, 2006), with athletes who use imagery reporting increased satisfaction with their rehabilitation compared with those who did not (Law et al.). Third, the interviews from Evans et al. revealed that athletes’ use of imagery across rehabilitation varied in terms of its clarity, vividness and control. However, imagery ability was not objectively assessed. It is important to assess imagery ability because it moderates the effect of athletes’ imagery use on possible outcomes (Martin et al., 1999) and, according to Gregg, Nederhof and Hall (2005), may be related to the different functions of imagery use in achieving these outcomes. Consequently, in an attempt to overcome these limitations the purpose of the current study was to further explore the affect of personal and situational variables on responses to injury and imagery use across three phases of rehabilitation, and return to competition, while considering perception of pain and imagery ability.

The second possible reason for the inconsistency in the findings of previous research relates to limitations of the AIIQ and AIIQ-2. Specifically, these questionnaires are based on existing theoretical frameworks of athletes’ imagery use in training and competition, and not grounded in injury and rehabilitation. Further, Short et al. (2004) proposed that the imagery functions detailed in the applied model of imagery (Martin, et al., 1999) and hence the AIIQ and AIIQ-2 actually relate to the content of images, whereas function relates to the purpose that the image has for the performer. Indeed, researchers have previously challenged the proposal that function (i.e., content) should match the desired outcome (e.g., MG-M should be used to enhance confidence), and have highlighted the importance of the meaning of the image to the athlete as opposed to the content (Callow et al., 2001). For example, in a rehabilitation context one athlete may use
the content of CS imagery to facilitate the rehearsal and execution of specific rehabilitation exercises, whereas another may use the same content to enhance self-confidence (cf. Evans et al., 2006). Consequently, athletes may interpret the content of the AIIQ and AIIQ-2 items differently due to the situation and the meaning they attach to them leading to inconsistent results across participants and hence studies.

In an attempt to address some of the limitations of the AIIQ-2, Driediger et al. (2006) used a mixed-methods approach. Specifically, qualitative interviews were used to gain a more comprehensive understanding of injured athletes’ imagery use during rehabilitation, and the AIIQ-2 was employed to provide additional information and support for the qualitative analysis. This enabled cross-referencing of athletes’ interview and AIIQ-2 responses (cf. Creswell & Tashakkori, 2007). This cross-referencing was important because although Driediger et al.’s qualitative data provided some support for the content of the AIIQ-2, specifically that the injured athletes used imagery for cognitive, motivational and healing functions, it failed to account for other important functions of imagery, in particular the use of imagery for pain management. Further, in contrast to Sordoni et al.’s (2000, 2002) studies athletes did not report using cognitive general imagery for rehabilitation purposes. A mixed-method approach was used in the current study to provide a comprehensive and complete description of the athlete’s imagery use in an attempt to consolidate and extend the research in this area (cf. Creswell & Tashakkori).

Thus, the general purpose of the current study was to address a number of limitations of existing research within imagery and injury rehabilitation using a mixed-method approach. Specifically the study explored the perceived affects of (a) personal and situational variables on an athlete’s responses to injury and imagery use, (b) the injured athlete’s perception of pain and imagery ability on imagery use, and (c) the functions and outcome of imagery use across rehabilitation and return to sport. The functional use of imagery has been explored fairly extensively in training and competition (see Hall, 2001 for a review), however this research has rarely been conducted with elite athletes (see Evans et al., 2000; Munroe, Giacobbi, Hall, & Weinberg, 2000 for notable exceptions). The present study, therefore, adopted a case study approach to examine in-depth an Olympic athlete’s use of imagery during rehabilitation from injury, and on return to competitive sport.

Method

Case Study

The purpose of a case study is to gather large amounts of comprehensive and in-depth information about a complex instance as a whole and in its context (Stake, 2000). Although case studies offer limited generalizability, a key strength of a case study is that it can do much to gain a better understanding of a case and provide insight into the experiences of athletes within a real life context (Patton, 2002a). The case study is, therefore, particularly useful for understanding activities that might be related to or involved with specific circumstances or incidents (Stake).
Participant

Participant selection was purposive (Lincoln & Guba, 1985); the participant competed at an elite level, had recently undergone a surgical intervention, and used imagery extensively in both training and competition. The participant was a male recent Olympic and World Championship medalist from an aquatic activity that is judged on form. At the time of the study, the participant was 28 years of age and in the first 2 weeks of a 3-month rehabilitation period. He had recently undergone a subscapula repair of the right shoulder to address a long-term injury. The participant had been working with a sport psychologist for 8 years at the time of the study, in the area of performance enhancement. The sport psychologist was not in any way involved in the current study, and during the study the participant did not see the sport psychologist. This lack of contact was not a requirement of the study’s protocol.

Measures

A principal qualitative method (semistructured interviews) was employed and complemented by the use of a number of quantitative measures (e.g., AIIQ-2, VMIQ-2).

Semistructured Interviews. Semistructured interviews were used to gain an in-depth understanding of the athlete’s use of imagery over different phases of rehabilitation, and on return to competition following injury. Based on a review of the relevant literature, a series of four semistructured interviews were conducted using an interview guide developed for the purpose of the study. The use of semistructured interviews provided the researcher with the flexibility to sequence the questions in a way that enhanced the natural flow of the interview (Lincoln & Guba, 1985). Probes were used where necessary to enhance the depth of responses and the richness of the data (Patton, 2002a).

The interview guide comprised questions that explored the perceived effect and function of the athlete’s use of imagery during injury rehabilitation (early, mid, and end), and in the return to full training and competition. The interview also examined the athlete’s psychological responses to injury, his imagery ability, and perception of pain. Once developed, two researchers experienced in qualitative interviewing and injury and imagery research scrutinized the guide with regard to content, structure, and the wording of questions (Patton, 2002a). Feedback from pilot interviews with two elite injured athletes formed the basis for making some minor revisions to the guide (e.g., wording of questions) and enabled the interviewer, the lead author, to practice and refine her interview skills and techniques. To ensure that the interview guide was suitable for each different phase of injury rehabilitation, the phase specified in the questions was changed to reflect the relevant phase (e.g., early phase was changed to mid phase). In addition, specific questions were added to the interview guide for the mid, end and return phases for comparative purposes, and to follow-up or gain clarification on issues that had emerged from the previous interview(s). For example, at the mid-phase the following was included in the interview guide: “When we last spoke, you described using images of . . . for the purpose of . . . Thinking back to your
images during the initial phase, what if any are the differences between your use of imagery now (mid phase of rehabilitation) and the initial phase?’”

**The Athletic Injury Imagery Questionnaire (AIIQ-2).** The Athletic Injury Imagery Questionnaire-2 (Sordoni et al., 2002) was used to assess the participant’s use of imagery at the three phases of rehabilitation (early, mid and end). The AIIQ-2 contains 16-items with an equal number of items representative of the motivational, cognitive and healing functions of imagery, plus questions relating to the use of imagery in the management of pain. The participant rated the frequency of his imagery use on a 7-point Likert scale anchored at 1 (*never use*) and 7 (*always use*).

Exploratory factor analysis of the AIIQ-2 revealed that all three functions were used by athletes during injury rehabilitation. Sordoni et al. (2000) demonstrated that the AIIQ-2 had adequate psychometric properties. Internal consistency was assessed using Cronbach’s alpha. Coefficients for healing (α = .93), cognitive (α = .86), and motivational (α = .87) imagery factors were all very good.

**Pain Intensity.** The Visual Analogue Scale (VAS, Huskisson, 1974) was administered at each stage of rehabilitation (early, mid and end). The VAS is a single item self report measure that requires participants to indicate the perceived amount of pain they are experiencing along a 10 cm (cm) line anchored at 0 cm (*no pain*) and 10 cm (*pain as bad as it could be*). The VAS provides a readily analyzable method of measuring pain intensity, is sensitive to changes in pain, and is reliable over time (Zusman, 1986).

**The Adapted Vividness of Movement Imagery Questionnaire (VMIQ-2).** At each stage of rehabilitation and during return to training and competition, the participant’s imagery ability was measured using the Adapted Vividness of Movement Imagery Questionnaire (VMIQ-2; Roberts, Callow, Hardy, Markland, & Bringer, 2008). The VMIQ-2 examines individual differences in the ability to image specified basic body movements and movements requiring precision and control. The VMIQ-2 contains 12 items that are repeated to measure internal visual imagery, external visual imagery, and kinesthetic imagery. Items were responded to on a 5-point Likert scale, which ranged from 1 (*perfectly clear and vivid as normal vision*) to 5 (*no image at all; you only know that you are thinking of the skill*).

Developed from the VMIQ (Isaacs, Marks, & Russell, 1986), the VMIQ-2 (Roberts et al., 2008) is a shortened version of the original 24-item VMIQ and provides a reliable and valid tool that measures both visual imagery perspectives and modalities (i.e., visual/kinesthetic). Roberts et al. provided support for the factorial validity of the VMIQ-2, using correlated traits correlated uniqueness (CTCU) analysis. Specifically, the fit statistics for the 12-item revised VMIQ-2 demonstrated a good model fit. Further, the VMIQ-2 correlated with existing measures of imagery ability (Movement Imagery Questionnaire-Revised; Hall & Martin, 1997), and discriminated between high and low level imagery ability athletes.
**Procedure**

Before the initial meeting the participant was informed of the purpose of the study, the focus of the interview, and ethical issues relating to the use of data and anonymity. The participant was also provided with the following definition of imagery; “Imagery is an experience that mimics real experience. We can be aware of ‘seeing’ an image, feeling movements as an image, or experience an image of smell, tastes or sounds without actually experiencing the real experience. . . .it differs from dreams in that we are awake and conscious when we form the image” (White & Hardy, 1998, p.389).

Once the participant had provided informed consent and agreed to take part in the study, a convenient time and location was identified to conduct the interviews. To account for and explore the possible changes in the athlete’s use of imagery at the different phases of rehabilitation, formal meetings with the participant were organized within 2 weeks of shoulder surgery, at the mid and end point of rehabilitation, and at the return to full training and competition. All meetings were conducted at the participant’s home, where he was asked to complete the VAS, VMIQ-2, and the AIIQ-2 before each semistructured interview was conducted. At the fourth interview (in the return to training and competition), the VAS and AIIQ-2 were not administered, as this phase was not classified as rehabilitation. Consequently, before the interview the athlete only completed the VMIQ-2. During each interview the participant was asked to reflect on and respond to the questions based on his use of imagery during that phase (early, mid, end, or return to full training and competition). The interviews lasted between 60 and 120 min, were tape recorded, transcribed verbatim (producing 130 pages of text) and returned to the participant for the purpose of data verification (Lincoln & Guba, 1985).

**Trustworthiness of Data and Analysis**

Several methods were used to enhance the trustworthiness of the data and to meet a number of the criteria proposed by Lincoln and Guba (1985). Specifically, investigator triangulation and peer review were used at each stage of the study (design, implementation, and data analysis), in an attempt to avoid for the potential bias that can arise from a single researcher operating in isolation (Lincoln & Guba, 1985; Patton, 2002a). Thick description of the data were provided to address the issues of credibility and transferability, and to allow the reader to arrive at their own interpretation (cf. Biddle, Markland, Gilbourne, Chatzisarantic, & Sparkes, 2001; Sparkes, 1998).

In the current study, the interview guide, which was based on an extensive review of the research literature, provided a deductive analytic framework. Thereafter, analysis of the interview data involved moving back and forth between deductive and inductive approaches. Consistent with Patton (2002b), this movement allowed for both the verification of deductively driven hypotheses and the exploration of inductive findings that emerged from the multiple interviews.

In relation to the analytical procedures, transcripts were independently studied in detail by the first author (interviewer) and analyzed to identify specific raw
data themes reflecting the use and effectiveness of the participant’s imagery and factors that were perceived to affect use and effectiveness during the different phases of rehabilitation. Peer debriefing was employed with the second author to ensure the accuracy of the author’s interpretation of the data (Lincoln & Guba, 1985). This process involved the second author scrutinizing the raw data, and subsequent analysis and interpretation. The inductive analysis of the data derived from each interview informed subsequent interviews with additional questions being included in the interview guide to follow-up or gain clarification on specific features of the data.

Descriptive statistics were calculated for the VMIQ-2, AIIQ-2 and the VAS to explore imagery ability, pain intensity, and the use and effectiveness of the athlete’s imagery during rehabilitation. The qualitative themes and quantitative data subsequently formed the basis of the discussion.

**Results and Discussion**

The purpose of this case study was to explore the perceived affect of personal and situational variables, perception of pain, and imagery ability on the function and outcome of an Olympic athlete’s imagery use across rehabilitation and return to sport. For ease of presentation, the results are reported at each stage of rehabilitation and on return to competition, with an overview of imagery use summarized in Table 1.

**Imagery Use During Rehabilitation**

**Early Phase of Rehabilitation.** During this first phase of injury rehabilitation a number of themes emerged. Consistent with the findings of Wiese-Bjornstal et al. (1998), the participant suggested that his previous injury history, specifically three shoulder surgeries, helped him deal with his current rehabilitation in a much more enlightened and positive way:

I’ve learnt a lot from my previous experiences, in my first lot of shoulder surgery I actually went into a period of depression . . . now I’m determined throughout this surgery that I’m not going to let myself get on that negative spiral. With that experience I’m in a positive frame of mind, I know I will get there in the end.

During this initial phase, the participant reported that although he had totally withdrawn himself from his sport he used imagery on a daily basis. At this stage his imagery revolved around the rehearsal and practice of rehabilitation exercises. He stated, “At the moment, my use of imagery is solely for my exercises. . . . I’m using imagery to try and improve them and make progress in those”. This use of the cognitive function of imagery supports Driediger et al.’s (2006) finding that injured athletes use CS imagery to enhance the learning and rehearsal of rehabilitation skills.

Importantly, the participant also associated the cognitive content of the images associated with the execution of his rehabilitation exercises with increased levels of confidence, a finding that supports research acknowledging that the same
<table>
<thead>
<tr>
<th>Phase of Rehabilitation</th>
<th>Use</th>
<th>Effect</th>
<th>Quality</th>
<th>Pain Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>CS—Rehab rehearsal</td>
<td>Increased confidence Relaxing Maintains positive attitude Motivation</td>
<td>Very vivid &amp; very good control. Unfamiliar with new skills.</td>
<td>Mild rating of pain</td>
</tr>
<tr>
<td>2</td>
<td>CS—Rehab rehearsal &amp; performance based basic skills</td>
<td>Increased confidence. Maintains positive attitude Motivation to adhere to rehab</td>
<td>Very vivid &amp; very good control. Unfamiliarity with imaging basic performance related skills.</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>CS—Purely performance based (complex skills). MG-A</td>
<td>Increased confidence Maintain positive attitude Motivation to return to sport Adrenaline, nerves, excitement.</td>
<td>Most clear and vivid due to practice &amp; familiarity of imaging complex skills. Very good control</td>
<td>None</td>
</tr>
<tr>
<td>Return to Training &amp; Competition</td>
<td>CS—Performance based. On the cusp of “Best Performance Imagery”</td>
<td>Increased confidence Control anxiety Reduce frustration Relaxed, reassured</td>
<td>Very clear and vivid and good control.</td>
<td>None</td>
</tr>
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</table>
content may be used to achieve more than one outcome (e.g., Evans, Jones, & Mullen, 2004; Short et al., 2004). In the athlete’s words, “it gives me the confidence to know that eventually I will be able to do the exercise I’m trying to do, say I can do it 80% complete, but mentally, each time I know that I can do the exercise 100%”. Further, the athlete repeatedly emphasized that the cognitive content of his imagery not only increased self confidence but also his motivation to adhere to his rehabilitation:

It makes me a lot more relaxed, and a lot more positive, and confident and assured, it just gives you that that “buffer” basically . . . never is it working against me or in a negative way, so it does, it acts in, yeah reassurance, and it drives the rehab, it does it just accelerates it on because it’s always that little bit ahead of where I am physically so I am just aspiring to be where I am practicing mentally.

This finding supports Evans et al. (2006) and Short et al.’s (2004) suggestion that it is difficult to discern between the cognitive and motivational functions of imagery when an image includes the successful execution of a skill and simultaneous goal attainment. It also suggests that the athlete’s images may serve a primary and secondary function and have a primary and secondary meaning. When questioned about the function of the image, the athlete suggested, “its a two pronged attack—I don’t think I can have the skill acquisition without the confidence coming with me and it needs to be coupled with motivation in order to make it possible I think”.

During this early phase of rehabilitation, the participant indicated the highest levels of pain on the VAS (see Table 2), albeit this level was low. Interestingly, the results of the AIIQ-2 (see Table 3) indicated a greater use of pain imagery at this phase than at any other phase of rehabilitation. Specifically in response to the item, “I imagine coping with the pain associated with my injury”, the participant reported “always”. However, with this item although the content of an image can be identified, the function of that image for the athlete is difficult to establish. To expand, the most parsimonious interpretation of this score is high usage of the pain management function. But, when the athlete’s qualitative response is explored a different interpretation could be made. For example, when providing an example of his imagery use during this phase, the participant stated,

So I’d close my eyes and I go ‘yeah, there goes my arm and it’s going all the way back and it’s pain free, great’—and then I’d go through the exercise and it wouldn’t go all the way back and it wouldn’t be pain free, but I knew what I was preparing for.

Table 2 Visual Analogue Scores

<table>
<thead>
<tr>
<th>Phase of Rehabilitation</th>
<th>Perception of Pain Intensity Visual Analogue Scales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.5 cm</td>
</tr>
<tr>
<td>2</td>
<td>0 cm</td>
</tr>
<tr>
<td>3</td>
<td>0 cm</td>
</tr>
</tbody>
</table>
When asked what the purpose of that image was, the participant reported that it was not to manage the pain but to learn the skill. Thus it can be seen that this content was being used for a cognitive not pain management function. Clearly, at an item level there are some limitations of the AIIQ-2 that may lead to ambiguity about the function of a specific image.

The results of the VMIQ-2 (see Table 4) showed the athlete’s internal visual imagery and to a greater extent imagery from a kinesthetic perspective was the most clear and vivid. Nevertheless, the participant reported that although his visual imagery was clear and vivid, he had initially found it difficult to imagine the feeling of new rehabilitation skills that were unfamiliar to him; although this improved with physical practice. He explained,

It is really, really clear, but it’s quite funny that I have to imagine myself doing something that I don’t quite know how it’s going to feel. So it’s difficult right, its like imagine yourself somewhere where you haven’t been yet, you kind of know what it might look or feel like, but you can’t know for sure.

The participant said that because he was unable to control images from an external perspective in a performance context, he found it less effective and did not use it.

**Midphase of Rehabilitation.** Importantly during this phase, the participant described how well rehabilitation had progressed and how he was able to look ahead to a return to training. This finding supports Wiese-Bjornstal et al.’s (1999)

<table>
<thead>
<tr>
<th>Phase of Rehabilitation</th>
<th>AIIQ-2 Subscale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cognitive</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>6.5</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Overall Mean</td>
<td>6.833</td>
</tr>
</tbody>
</table>

**Table 3  Mean Scores for the AIIQ-2**

<table>
<thead>
<tr>
<th>Phase of Rehabilitation</th>
<th>VMIQ-2 Imagery Perspectives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External</td>
</tr>
<tr>
<td>1</td>
<td>4.083</td>
</tr>
<tr>
<td>2</td>
<td>3.583</td>
</tr>
<tr>
<td>3</td>
<td>3.75</td>
</tr>
<tr>
<td>4</td>
<td>3.583</td>
</tr>
<tr>
<td>Overall Mean</td>
<td>3.75</td>
</tr>
</tbody>
</table>

**Table 4  Mean Scores for the VMIQ-2**
model of response, demonstrating the influence of situational factors such as rehabilitation progress on the emotional and behavioral response to injury (cf. Bianco et al., 1999; Evans et al., 2000; Johnston & Carroll, 1998). The participant explained that his imagery use usually took place following rehabilitation at the pool, he stated, “I’ve been spending some time on the poolside, closing my eyes and doing some internal imagery of some of the basic skills, movements I’m gonna be doing. Without getting too excited and ahead of myself I’m mentally preparing.” Concerned about losing the kinesthetic awareness that was crucial to his performance, the participant described using imagery to “refire schemas” and familiarize himself with some of the basic techniques of his sport;

at the minute [my imagery is] concentrating on skills and just kind of getting those muscles firing again . . . what happens with [sport] is you have a little time out and your kinesthetic awareness goes right off, and you get in and you can’t feel where your body is and it’s all a bit alien, so I’m hoping to use the imagery to help me with that.

Consistent with Driediger et al. (2006), he described using CS imagery to learn new exercises that had been introduced into his rehabilitation program. However, he felt that most of the gains and improvements in his shoulder resulted from the investment he had made in being able to do most of his exercises correctly in the early phase. For this reason he suggested the benefits of imagery in the rehearsal and execution of the rehabilitation skills were not as great in the mid phase as in the early phase. Nevertheless, he used CS imagery at this stage to rehearse and practice skills in both a rehabilitation and performance context. He suggested this increased his positive attitude, motivation to adhere to rehabilitation, and confidence to execute specific skills, and in his ability to return to sport (cf. Evans et al., 2006). The participant suggested,

I use imagery as a tool, I only use it because it’s something that has a positive effect. My confidence is higher, my self esteem is higher . . . it keeps me positive, it keeps me looking forward, not looking backwards, it paves the way and it makes my rehabilitation and my progress a lot smoother.

Once again the athlete suggested his images served a number of different functions, a finding that reinforces the need to distinguish between imagery content and function (Short et al., 2004). The results of the AIIQ-2 supported the qualitative findings that cognitive and motivational imagery was used to the greatest extent. They also showed that imagery concerned with healing and the management of pain was synonymous with reduced levels of pain as indicated by the VAS. This finding is consistent with Milne et al.’s (2005) finding that injured athletes used more motivational and cognitive imagery than healing imagery.

The results of the VMIQ-2 indicated that although kinesthetic imagery was again the strongest in terms of its quality, the clarity and vividness of imagery had decreased in comparison with the previous phase (it was the lowest of all three phases). Synonymous with the results of the VMIQ-2, the participant explained that although visually his images were perfectly clear and vivid, because he had been unable to physically practice he had lost some of the normal kinesthetic feel
which was part of his sport. The participant also described how his use of imagery in the rehearsal of unfamiliar rehabilitation skills was often more challenging and required greater concentration than that of his performance related skills (cf. Diediger et al., 2006). He stated, “ask me to visualize a [performance related skill] it’s like that [clicks fingers], now. Because that’s a skill that I’ve developed and practiced; but visualizing an exercise that I have never done or haven’t done very many times, that’s different.” When asked if he felt this had any effect on his use of imagery, he explained, “it just makes it a little bit more of a challenge, it never really knocks your confidence it just makes you feel it’s more of a challenge having to use it in those ways.”

**End of Rehabilitation.** During this phase, which coincided with the participant’s return to low intensity training in the pool, the athlete’s imagery primarily took the form of CS imagery in the rehearsal of performance related skills. He no longer used imagery for rehabilitation activities. The participant explained,

> There are changes in what I’m imagining—in the midphase I was just touching on the [skill], they were the basic [skills], now I’ve moved completely away from the rehabilitation exercises solely to the pool, and away from the easy [skills] that I was doing then, to the much more complex ones that I’m doing now.

At this stage of his rehabilitation, he described using imagery to “wake up those neuro-pathways,” maintain a positive attitude, and create optimal levels of self confidence to return to sport; a finding consistent with that reported by Evans et al. (2006). The athlete explained,

> I’m using my imagery to first of all re-fire the schemas in my mind, go through what it’s going to feel like internally—it’s always having that positive effect, it’s taking that step in my mind before I take that step in reality, it increases my motivation and most importantly a robust self confidence.

In contrast to the previous phases, the athlete’s imagery use was becoming increasingly similar to his use of imagery before injury, in terms of factoring in aspects of the environment to make the images more real: “I see the scoreboards, the swimming pool, the water in front of me, I sense the hustle and bustle, the water going into the grates, the feel of the warmth in the air—I’m just aware of that atmosphere.” The athlete associated these images with feelings of adrenaline, nerves, and the excitement of performing in preparation for competition (a motivational arousal function). Consistent with the qualitative analysis, results of the AIQ-2 showed that once again the athlete used cognitive and motivational imagery to the greatest extent, and for similar functions. As in the previous phase, the athlete did not experience any pain at the site of injury, and as a result, did not employ imagery for healing or pain management (cf. Evans et al.). He described using images of performing the skill pain free to rehearse the skill and maintain a positive attitude.

Consistent with the results of the VMIQ-2, the athlete felt that his images at this stage were the most clear and vivid of any phase. He also suggested that the images were easier to invoke because of greater familiarity with the skills; “now
I’m visualizing myself doing [skills] that I’ve done so many times before and that I’ve visualized before, so the images here are much stronger and they need less effort for them to be effective.”

**Return to Full Training and Competition.** During this phase of rehabilitation, the participant had returned to full training, and was looking ahead to his preparation for the World Championships. The participant reported feeling positive and excited about his return to training and competition, but also frustrated at not being able to achieve his physical preinjury performance levels. He stated,

I’m able to do my full repertoire again, but I’m almost having to be patient for them to come back to the feeling and the level that I was at previously . . . I’m still using the imagery to get to a level where they need to be; it’s reinforcing those images and reinforcing those schemas.

The athlete explained that he no longer employed any of the functions of imagery for injury rehabilitation purposes (cf. Evans et al., 2006). During this phase, his description of CS imagery was consistent with Martin et al.’s (1999) applied model and focused on the rehearsal of performance related skills of the highest level, in the hope that by imaging the skills perfectly it would help the physical execution of the skills. The participant used imagery as part of his daily training routine at the pool and described the use of kinesthetic imagery while simultaneously going through the movements physically to experience the muscle contractions associated with the skill:

I’m representing the [skill] in my head with as much of the kinesthetic movement as I can without doing the [skill]. I’m doing the [skill] internally perfectly each time and regularly without the strain of having to do it, and hopefully that will carry over.

In describing the effect that this image had, he explained, “when I’m about to perform and I’ve done my imagery that day, I actually feel more relaxed, less nervous, less anxious, and more confident because I’ve been through the skill so many times in my head.” Once again it was difficult to distinguish between the motivational and cognitive features of his imagery.

During this phase the athlete explained that the images were carried out in real time consisting of just four or five second’s duration, and as a result, unlike his imagery use in the previous phase(s) he was unable to experience any emotions that may be associated with the performance itself. Similar to his use of imagery during the previous phase the athlete described incorporating his surroundings in to his images to make the images more realistic.

The results of the VMIQ-2 were consistent with the previous phases, in that the participant described external imagery as being the least strong perspective in terms of its quality, and kinesthetic imagery, the strongest. In relation to the quality of his images the participant explained, “it’s making small improvements because of the regularity that I’m doing it, whereas before in my rehab I wasn’t doing the [skills] and now I have been doing them for a while they’re [images] getting clearer and better” (cf. Driediger et al., 2006).
Summary and Conclusion

The present study explored the perceived affects of (a) personal and situational variables on an athlete’s responses to injury and imagery use; (b) the injured athlete’s perception of pain and imagery ability on imagery use; and (c) the functions and outcome of imagery use across rehabilitation and return to sport.

The results of the study showed the athlete’s imagery use changed across rehabilitation (cf. Evans et al., 2006), and provided some support for Wiese-Bjornstal et al.’s (1998) cognitive appraisal model and the personal and situational factors proposed to influence athletes’ responses to injury. Specifically, in the first phase of injury rehabilitation the participant reported that having experienced three previous shoulder surgeries, he was able to deal with his current rehabilitation in a much more enlightened and positive way (cf. Wiese-Bjornstal et al.). CS imagery content was used at this stage to rehearse and practice rehabilitation exercises, maintain a positive attitude, and increase levels of motivation and relaxation, and more specifically self confidence. During the mid phase, and in response to seeing progress in his rehabilitation, the athlete described using CS imagery to rehearse and practice skills in both a rehabilitation and performance context. This content was also used to maintain a positive attitude, increase levels of motivation to adhere to rehabilitation, and enhance self confidence. In the end phase of rehabilitation and during his return to low intensity training in the pool, the participant’s imagery use was purely performance based. CS imagery was used to rehearse specific performance skills, maintain a positive attitude and increase self confidence, in preparation for his return to training and competition. In the athlete’s return to full training and competition, imagery was used to facilitate the rehearsal of performance related skills, control anxiety, reduce levels of frustration in his performance levels, and most importantly increase self confidence.

The findings support the view that an athlete may use different types of imagery to achieve different types of outcomes than those proposed by Martin et al.’s (1999) framework of imagery functions (e.g., cognitive images of rehearsal and practice of rehabilitation exercises increased confidence and motivation, and pain imagery enhanced skill learning cf. Short et al., 2004). The athlete also described using a single image to achieve multiple outcomes, often making it difficult to distinguish between the cognitive and motivational functions of imagery (cf. Evans et al., 2006). The inability of the AIIQ-2 to distinguish between image content and function, in the context of the current study provides support for the mixed-method approach adopted. It also helps to explain some of the inconsistencies in the findings that have been reported in previous research that has employed the AIIQ-2 as opposed to interviews, for data collection purposes. Future research may need to develop the AIIQ-2 to distinguish between the content of an image, the purpose, and its effect.

The present study had a number of other strengths: (a) it provides a rare insight into an Olympic athlete’s use of imagery in injury rehabilitation; (b) it considered the affect of personal and situation variables on the athletes responses to injury and imagery use; (c) not only was imagery explored over the different
phases of rehabilitation, it was also examined during return to competition following injury (cf. Podlog & Eklund, 2006); and (d) it explored the perceived effect of imagery ability on imagery use. In relation to the latter, the results of the VMIQ-2 (Roberts et al., 2008) and the qualitative data indicated that kinesthetic imagery was the athlete’s strongest modality, scoring the highest degree of clarity and vividness over all four phases of rehabilitation. For this reason it is perhaps not surprising that the athlete was more inclined to use this imagery modality, having developed and practiced it in training and competition. The participant admitted having difficulty in controlling images from an external visual perspective, and because he found this imagery less effective, he did not use it. Perhaps not surprisingly, he found it difficult to embrace other functions of imagery than those he used in training and competition, and with which he was less familiar, despite their potential merits in a rehabilitation context. Future research may wish to explore the knowledge of those involved in the treatment of injured athletes (e.g., sport psychologists, medical personnel), to ensure that athletes are aware of the full range of imagery functions and their potential benefits.

Finally, while the assessment of the athlete’s perception of pain was considered a strength of the study, there was a limitation associated with the findings that emerged in relation to it. Specifically, the very low levels of pain observed made it difficult to assess the perceived effect of the athlete’s perception of pain on his imagery use. There may be a number of possible explanations for the low level of pain reported, including the use of painkillers, the early immobilization of the shoulder and possibly a high pain threshold, and also the effect of imagery in helping to reduce pain (Syrjala, Donaldson, Davis, Kippes, & Carr, 1995). Future studies should explore the relationship between athletes’ perception of pain and imagery use, while attempting to control for factors that may affect pain perception.

It is important to acknowledge that the current study had a number of limitations. The case study approach while providing depth in a specific context is limited in its ability to be generalized to the wider population (Stake, 2000). Due to the retrospective nature of the study, the findings may also have been subject to possible memory decay (Bryant, Norman, Stratford, Marx, Walter, & Guyatt, 2006) and recall bias (Brewer et al., 2004). However, in the current study with the repeated data collections during rehabilitation and return to competition there is less potential for memory decay and recall bias than in more traditional approaches that have employed one data collection point at the end of rehabilitation (cf. Coughlin, 1990).

A number of practical implications emerged from the current study. Sport psychologists should be cognizant of the possible role of a variety of personal and situational variables that may be temporally defined on athletes’ use of imagery during rehabilitation and shape their interventions accordingly. This along with the athletes’ varying priorities and needs at different phases of rehabilitation (e.g., increased motivation and confidence) may affect the use of different imagery modalities and in turn their effectiveness in expediting the athletes’ return to sport. In addition, it may be useful to educate athletes in different types of imagery than those they are familiar with and use in a performance context to facilitate a variety of rehabilitation outcomes.

In acknowledging the benefits of imagery in a rehabilitation context, researchers are encouraged to examine the different imagery functions, modalities and
visual imagery perspectives of athletes’ imagery use as a basis for exploring the efficacy of different imagery intervention strategies. Such research should, wherever possible, be conducted temporally. Future studies may also wish to examine injured athletes from different sports and different sporting contexts to explore the relationship between function and outcome.

Note

1. The participant has read this manuscript, and has given his consent for this level of participant detail to be included.

References


