

# Athletic Trainers' and Physical Therapists' Perceptions of the Effectiveness of Psychological Skills Within Sport Injury Rehabilitation Programs

J. Jordan Hamson-Utley, PhD, ATC\*; Scott Martin, PhD, AASP Certified Consultant†; Jason Walters, MHS, PT, CSCS‡

\*Weber State University, Ogden, UT; †University of North Texas, Denton, TX; ‡AthletiCo Physical Therapy and Sports Medicine, Chicago, IL

**Context:** Psychological skills are alleged to augment sport-injury rehabilitation; however, implementation of mental imagery within rehabilitation programs is limited.

**Objective:** To examine attitudes of athletic trainers (ATs) and physical therapists (PTs) on the effectiveness of mental imagery, goal setting, and positive self-talk to improve rehabilitation adherence and recovery speed of injured athletes.

**Design:** The ATs and PTs were contacted via electronic or physical mailings to complete a single administration survey that measured their beliefs about the effectiveness of psychological skills for increasing adherence and recovery speed of injured athletes undergoing rehabilitation.

**Setting:** Professional member databases of the National Athletic Trainers' Association and the American Physical Therapy Association.

**Patients or Other Participants:** Of the 1000 ATs and 1000 PTs who were selected randomly, 309 ATs (age =  $34.18 \pm 8.32$  years, years in profession =  $10.67 \pm 7.34$ ) and 356 PTs (age =  $38.58 \pm 7.51$  years, years in profession =  $13.18 \pm 6.17$ ) responded.

**Main Outcome Measure(s):** The Attitudes About Imagery (AAI) survey measures attitudes about psychological skills for

enhancing adherence and recovery speed of injured athletes. The AAI includes demographic questions and 15 items on a 7-point Likert scale measuring attitudes about the effectiveness of mental imagery, self-talk, goal setting, and pain control on rehabilitation adherence and recovery speed of injured athletes. Test-retest reliability ranged from .60 to .84 and Cronbach  $\alpha$ s ranged from .65 to .90. We calculated 1-way analyses of variance to determine whether differences existed in attitudes as a result of the professionals' education, training experience, and interest.

**Results:** Mean differences were found on attitudes about effectiveness of psychological skills for those who reported formal training and those who reported interest in receiving formal training ( $P < .05$ ). In addition, ATs held more positive attitudes than PTs on 9 of 15 AAI items ( $P < .05$ ).

**Conclusions:** Overall, ATs and PTs held positive attitudes on the effectiveness of psychological skills to augment the rehabilitation process. Clinical implications regarding the use of mental skills are discussed.

**Key Words:** mental imagery, rehabilitation adherence, recovery speed, injured athletes

## Key Points

- Athletic trainers and physical therapists held positive attitudes on the effectiveness of psychological skills to improve the rehabilitation process.
- Athletic trainers received formal education on the use of psychological skills with injured athletes and held significantly more positive attitudes on 9 of 15 Attitudes About Imagery survey items.
- Injury rehabilitation programs that include the use of psychological skills, such as mental imagery and relaxation, may benefit through higher adherence rates and faster recovery times.

Returning athletes to competition after sport injury is a key role of athletic trainers (ATs) and physical therapists (PTs). Negative psychological responses to injury often result in a lack of rehabilitation adherence or prolonged recovery rates (or both),<sup>1</sup> prompting those who work with injured athletes to look for additional strategies to improve the overall rehabilitation process. Psychological skills can be used during sport injury rehabilitation to motivate athletes to adhere to rehabilitation, to increase speed of recovery, to control anxiety levels, and to enhance self-confidence.<sup>2–8</sup> In addition, ATs and PTs are in the best position to educate athletes on the use of psychological interventions to enhance the recovery process. However, those who hold negative attitudes

toward certain psychological skills are less likely to implement them during rehabilitation. Thus, receiving formal training probably would increase positive attitudes toward the use of psychological skills and would strengthen the likelihood that they are used during rehabilitation.

Research on the knowledge and skills that contribute to the successful rehabilitation of injured athletes indicates that the athletes should be willing to listen, to maintain a positive attitude, and to be intrinsically motivated and willing to learn about the injury and rehabilitation techniques, whereas ATs should have good communication skills, keep athletes involved with their team and coaches, and help athletes set realistic goals.<sup>9</sup> Oddly enough, psychological skills typically used in other areas to improve

communication, enhance adherence and motivation, and reduce anxiety have been reported as underused or less important to the rehabilitation process by athletes and athletic training personnel.<sup>10,11</sup> However, research indicates that psychological skills are not only important but essential during the rehabilitation of injured athletes.<sup>8,12–14</sup> For example, imagery is effective in reducing performance anxiety.<sup>15,16</sup> Thus, imagery and other psychological skills may have a parallel role as anxiety-reduction techniques within sport injury rehabilitation,<sup>8,17,18</sup> especially when athletes feel pressured to return to competition too soon after injury.<sup>10</sup>

Anxiety and negative stressors are widely reported psychological issues that accompany athletic injury.<sup>6,7,19,20</sup> Although many models attempt to understand athletes' psychological responses to injury, the integrated model of response,<sup>21</sup> which is a stress-based cognitive appraisal model, has received the most empirical support to date.<sup>12</sup> It purports that an athlete's response to injury (cognitive appraisal) is influenced by both personal and situational factors and that the associated behavioral and emotional responses (eg, adherence to rehabilitation, negative self-talk, frustration) have an effect on the physical and mental recovery from injury. In addition, the model emphasizes that coping skills, including mental imagery, relaxation, positive self-talk, and goal setting, are instrumental in influencing positive behavioral and emotional outcomes (eg, adherence, anxiety reduction, positive outlook).

Current educational standards require ATs to be educated on the psychological aspects of injury and specifically the use of psychological skills within rehabilitation programs.<sup>22</sup> Although ATs are instructed formally and are evaluated on the usefulness of psychological skills, they do not necessarily learn how to use such skills effectively or regularly include them during the athletic injury rehabilitation process. The educational preparation of PTs in this dimension is not comparable to that of ATs. The Commission on Accreditation in Physical Therapy Education (CAPTE), the agency responsible for accrediting entry-level physical therapy educational programs in the United States, does not include specific clinical psychology coursework as a component of the professional education for the PT.<sup>23</sup> Although CAPTE does require the behavioral sciences as a didactic component of the professional educational foundation, specific training in the direct interventions of mental imagery and mental practice is not required. In addition, the *Guide to Physical Therapist Practice*<sup>24</sup> (the core document describing the profession of physical therapy) does not include mental imagery or mental-practice techniques as types of direct intervention that PTs can provide to their patients. Therefore, we decided to examine whether (1) current educational standards lead to the implementation of mental imagery and other psychological skills during the rehabilitation process and (2) attitudes toward psychological skills of ATs and PTs who rehabilitate injured athletes are similar or different.

We hypothesized that ATs who graduated from an accredited education program would report more positive attitudes on the effectiveness of mental imagery than those ATs who did not graduate from an accredited program. Additionally, we hypothesized that due to the education requirement of ATs in accredited programs, they would report more positive attitudes on the effectiveness of mental imagery than PTs (who do not share the same

educational requirements). We also examined whether possessing formal education and interest in receiving formal education were related to more positive attitudes regarding use of mental imagery to rehabilitate injured athletes.

## METHODS

### Participants

Athletic trainers and PTs were selected due to their roles in the rehabilitation of sport injuries. All participants included in our study were nationally certified in their profession and at least 21 years of age. The ATs were selected randomly from regular certified National Athletic Trainers' Association (NATA) members and were employed in the following settings in the United States: (1) clinical, (2) clinical/high school, (3) university or college, or (4) professional sports. The PTs were selected randomly from American Physical Therapy Association (APTA) members and were employed in orthopaedic outpatient rehabilitation settings in the United States.

### Procedures

The ATs (n = 1000) were selected randomly by the NATA research representative and were sent the link to the survey with an NATA cover letter via e-mail. The online survey contained an informed consent, followed by the Attitudes About Imagery (AAI) survey. The participants were given 3 months to respond to the initial e-mail; a second e-mail was sent as a reminder at 2 months. Upon submitting the survey, the participant was thanked.

Similarly, the APTA research representative randomly selected physical therapists (n = 1000), and mailing addresses were provided electronically to the primary researcher. A mailing, which included a cover letter, an informed consent, and the AAI, with a postage-paid return envelope, was sent to each of the 1000 PTs. The APTA did not allow for a second mailing as a follow-up reminder to nonrespondents.

### Survey

The AAI survey contains 15 items that measure attitudes about the effectiveness of mental imagery, positive self-talk, goal setting, and pain tolerance to improve adherence and recovery speed of rehabilitating athletes. A sample item from the AAI survey reads, "The use of mental imagery to increase relaxation is an effective way to reduce anxiety prior to and following surgery" and the response is on a 7-point Likert scale with anchors *strongly disagree* and *strongly agree*. The AAI was developed for this research based on components of the integrated model of response,<sup>19</sup> and 4 experts from 3 areas of specialization (sport psychology, athletic training, and physical therapy) assessed the content validity. Experts critiqued the measure based on item wording, relevance, and appropriateness for assessing attitudes on psychological skills. Changes were made to the original instrument if 50% of experts specified the same change (eg, item wording, item inclusion, item ordering). The measure was then revised and returned to the same 4 experts for reevaluation. Based on the feedback received, the final measure differed from the original AAI

**Table 1. Participant Demographics by Professional Group**

|               | Athletic Trainers | Physical Therapists |
|---------------|-------------------|---------------------|
| n             | 309               | 356                 |
| Sex, No. (%)  |                   |                     |
| Men           | 149 (48.2)        | 148 (41.6)          |
| Women         | 160 (51.8)        | 208 (58.4)          |
| Age, y        |                   |                     |
| Mean ± SD     | 22–67             | 23–62               |
| Range         | 34.18 ± 8.32      | 38.58 ± 7.51        |
| Experience, y |                   |                     |
| Mean ± SD     | 10.67 ± 7.34      | 13.18 ± 6.17        |
| Range         | 1–33              | 1–36                |

in that (1) the number of items was decreased from 17 to 15 based on redundancy, (2) the Likert scale was increased from 5 points to 7 points based on improving reliability and ability to discriminate, and (3) item wording was changed for clarity. Coefficients of reliability, including test-retest values and Cronbach  $\alpha$ s, also were used to evaluate the AAI. In a pilot sample of university kinesiology majors ( $n = 100$ ), 2-week test-retest reliability correlations were .60 to .84 on all 15 items (all correlations were significant at the .01 level). Items on the AAI were grouped according to their focus, and 4 clusters were identified. Cronbach  $\alpha$ s were an additional measure of reliability for 8 mental imagery items (.90), 3 positive self-talk items (.65), 2 goal-setting items (.77), and 2 pain tolerance items (.77). The measures of internal reliability and interitem reliability supported the experts' guidance on content validity.

### Statistical Analysis

We used SPSS statistical software (version 14.0; SPSS Inc, Chicago, IL) for statistical analyses; the  $\alpha$  level was set at .05 to indicate statistical significance. We analyzed the attitudes of ATs and PTs with a series of 1-way analysis of variance (ANOVA) procedures. Using descriptive statistics, we analyzed participant demographics of sex, age, and years of experience in the profession. Pearson correlations were used to explore the relationship between experience in

the profession and use of psychological skills. Simple frequencies were employed to identify history of (1) education in an accredited program, (2) formal training on mental imagery use with injured athletes, and (3) interest in gaining formal training on mental imagery use with injured athletes.

### RESULTS

The overall response rate to our survey was 33.3% ( $n = 665$ ), comprising 309 ATs and 356 PTs. Of these respondents, 44.7% were men ( $n = 297$ ) and 55.3% were women ( $n = 368$ ). It is important to note that the mode of delivery of the survey had a minimal effect on response rate: 30.9% of ATs surveyed via e-mail as compared with 35.6% of PTs surveyed via physical mail responded to the AAI. Table 1 presents the demographics of this sample, including sex, age, and years of experience in the profession.

Using a 1-way ANOVA, we found no effect of education within an accredited athletic training program on ratings of effectiveness of psychological skills to improve the rehabilitation process; there were also no mean differences on any of the 15 items on the AAI. To examine further, we calculated 2 additional 1-way ANOVAs using the variable "years of experience in the profession" to narrow the subjects to 10 years or less ( $n = 178$ ) and then narrowing again to 5 years or less ( $n = 98$ ). Consistent with our whole-group comparison, no mean differences were noted on any of the AAI items for those who graduated in the last 10 or last 5 years from an accredited program, as compared with those who did not graduate from an accredited program. Furthermore, ATs and PTs who reported having formal training in the use of mental imagery gave more positive responses about the effectiveness of psychological skills on 14 of 15 items on the AAI than those who did not report such training (Table 2). Both groups reported pain tolerance as important regardless of formal training experience (formal training =  $6.29 \pm 0.89$ , no formal training =  $6.18 \pm 0.94$ , on a 7-point scale, with 4 being a neutral attitude). In addition, ATs and PTs who communicated an interest in gaining formal training on the use of mental imagery reported more positive attitudes on all 15

**Table 2. Participants' Formal Education, Formal Training, and Interest in Gaining Formal Training in Psychological Skills Within Sport Injury Rehabilitation Programs**

|                                 | Yes<br>Mean ± SD | No<br>Mean ± SD | F     | P    | Effect Size |
|---------------------------------|------------------|-----------------|-------|------|-------------|
| Accredited program <sup>a</sup> | n = 210          | n = 145         |       |      |             |
| Mental imagery                  | 5.34 ± 1.06      | 5.33 ± 0.95     | 0.002 | .962 | 0.01        |
| Goal setting                    | 6.39 ± 0.91      | 6.32 ± 0.81     | 0.573 | .450 | 0.09        |
| Positive self-talk              | 6.02 ± 0.87      | 6.04 ± 0.70     | 0.045 | .833 | 0.03        |
| Pain control                    | 6.32 ± 0.90      | 6.21 ± 0.90     | 1.39  | .239 | 0.12        |
| Formal training                 | n = 115          | n = 550         |       |      |             |
| Mental imagery                  | 5.66 ± 0.86      | 5.27 ± 0.98     | 15.32 | .000 | 0.45        |
| Goal setting                    | 6.50 ± 0.70      | 6.10 ± 0.96     | 16.97 | .000 | 0.57        |
| Positive self-talk              | 6.19 ± 0.62      | 5.93 ± 0.86     | 9.68  | .002 | 0.42        |
| Pain control                    | 6.29 ± 0.89      | 6.18 ± 0.94     | 1.19  | .277 | 0.12        |
| Interest in formal training     | n = 415          | n = 250         |       |      |             |
| Mental imagery                  | 5.56 ± 0.89      | 4.99 ± 1.00     | 59.67 | .000 | 0.64        |
| Goal setting                    | 6.29 ± 0.85      | 5.96 ± 1.02     | 20.04 | .000 | 0.39        |
| Positive self-talk              | 6.08 ± 0.77      | 5.80 ± 0.90     | 18.59 | .000 | 0.36        |
| Pain control                    | 6.29 ± 0.88      | 6.04 ± 1.00     | 11.15 | .001 | 0.28        |

<sup>a</sup> Not all respondents answered this question.

**Table 3. Results on Selected Items in 4 Subscales of the Attitudes About Imagery Survey**

| Attitudes About Imagery Subscale and Items   | Athletic Trainers | Physical Therapists | Analysis of Variance |                    |             |
|--|-------------------|---------------------|----------------------|--------------------|-------------|
|  | Mean ± SD         | Mean ± SD           | F                    | P                  | Effect Size |
| Mental Imagery   | 5.39 ± 0.99       | 5.29 ± 0.96         | 1.70                 | .19                | 0.10        |
| 1. Mental imagery is an effective way to increase focus on specific rehabilitation exercises.  | 5.47 ± 1.21       | 5.62 ± 1.20         | 2.61                 | .11                | 0.12        |
| 2. Mental imagery is an effective way to increase focus on specific goals of rehabilitation.   | 5.56 ± 1.19       | 5.42 ± 1.27         | 2.17                 | .14                | 0.12        |
| 3. Mental imagery is an effective way to decrease pain during rehabilitation exercises.  | 4.73 ± 1.45       | 4.91 ± 1.33         | 2.64                 | .10                | 0.14        |
| 5. Mental imagery is an effective way to maintain a positive mindset during a long rehabilitation from sport injury.   | 5.95 ± 1.10       | 5.69 ± 1.16         | 9.00                 | .003 <sup>a</sup>  | 0.24        |
| 6. Mental imagery during rehabilitation can aid the recovery process by visualizing healing occurring within the body.   | 4.98 ± 1.49       | 4.85 ± 1.42         | 1.44                 | .23                | 0.09        |
| 7. Mental imagery during rehabilitation from sport injury has the potential to return the athlete to full participation faster than without the use of mental imagery. | 5.19 ± 1.30       | 5.12 ± 1.24         | 0.587                | .44                | 0.06        |
| 14. Mental imagery during rehabilitation is an effective way to increase motivation to complete rehabilitation exercises.  | 5.48 ± 1.19       | 5.28 ± 1.20         | 4.70                 | .03 <sup>a</sup>   | 0.17        |
| 15. Mental imagery to increase relaxation is an effective way to reduce anxiety prior to and following surgery.  | 5.80 ± 1.21       | 5.50 ± 1.24         | 9.92                 | .002 <sup>a</sup>  | 0.25        |
| Positive Self-Talk   | 6.09 ± 0.72       | 5.88 ± 0.91         | 10.66                | .001 <sup>a</sup>  | 0.29        |
| 4. The use of positive self-talk is an effective way to decrease pain during rehabilitation.   | 5.28 ± 1.33       | 5.30 ± 1.25         | 0.025                | .87                | 0.02        |
| 8. A positive attitude during rehabilitation will increase the athlete's adherence rate.   | 6.51 ± 0.89       | 6.17 ± 1.05         | 19.79                | <.001 <sup>a</sup> | 0.38        |
| 11. A positive attitude during rehabilitation will help speed up the recovery process.   | 6.46 ± 0.80       | 6.16 ± 1.00         | 17.54                | <.001 <sup>a</sup> | 0.35        |
| Controlling Pain   | 6.35 ± 0.77       | 6.06 ± 1.03         | 17.00                | <.001 <sup>a</sup> | 0.38        |
| 9. Controlling the level of pain associated with rehabilitation exercises will help speed up the recovery process.   | 6.37 ± 0.93       | 6.09 ± 1.17         | 11.60                | .001 <sup>a</sup>  | 0.30        |
| 12. Controlling the level of pain associated with rehabilitation exercises will increase the athlete's adherence rate.   | 6.35 ± 0.89       | 6.04 ± 1.05         | 16.43                | .000               | 0.35        |
| Goal Setting   | 6.43 ± 0.78       | 5.94 ± 1.00         | 49.30                | <.001 <sup>a</sup> | 0.63        |
| 10. Setting appropriate rehabilitation goals will help speed up the recovery process.  | 6.41 ± 1.01       | 5.97 ± 1.10         | 29.80                | <.001 <sup>a</sup> | 0.44        |
| 13. Setting appropriate rehabilitation goals will help improve the athlete's adherence rate.   | 6.46 ± 0.81       | 5.92 ± 1.07         | 51.73                | <.001 <sup>a</sup> | 0.67        |

<sup>a</sup> Significant at  $P < .05$  level.

AAI items than those who did not communicate an interest ( $P < .001$ ).

Further analysis of the subscale mean responses revealed more positive attitudes about the effectiveness of goal setting, positive self-talk, and pain tolerance among ATs than PTs (Table 3). Overall, the ratings of the effectiveness of mental imagery by both groups were positive; mean ratings of the 8 imagery items on the AAI ranged from 4.73 to 5.95.

## DISCUSSION

The purpose of our study was 2-fold: (1) to identify if educational standards of accredited programs, formal training, and interest in gaining formal training were associated with positive attitudes and the implementation

of mental imagery and other psychological skills during the rehabilitation process, and (2) to evaluate if attitudes toward psychological skills of ATs and PTs who rehabilitate injured athletes are similar or different.

We compared the attitudes of ATs and PTs on the effectiveness of various psychological skills shown by prior researchers<sup>8,12-14</sup> to be useful in the rehabilitation of injured athletes. Our results indicated that ATs reported more positive attitudes than PTs on survey items that paired a psychological skill with a behavioral outcome (9 of 15 AAI items). Examples of this include "Setting appropriate rehabilitation goals will help speed up the recovery process" and "Setting appropriate rehabilitation goals will help improve the athlete's adherence rate." To explain further, it could be that ATs face injured athletes' inability to adhere to rehabilitation more often and feel

more pressure to speed up the recovery process in college and university settings than PTs do in outpatient clinical settings. It could also be that the 2 professionals approach the psychological aspects of injury differently in clinical practice. The 9 items that were different were related primarily to controlling pain and pain tolerance, positive self-talk and maintaining a positive mindset, and motivational goal setting. The lack of difference on mental imagery items (6 of 8) between ATs and PTs might be attributed to less knowledge of the technique and the application of the technique across both professions. Originally, we assumed that ATs would have more positive attitudes toward psychological skills due to their formal education; however, this was not the case. Positive attitudes on the use of goal setting to augment rehabilitation adherence and increase recovery speed are consistent with prior research.<sup>25</sup>

In contrast to prior researchers,<sup>9,10,26</sup> we found positive responses overall to the influence of psychological skills within the rehabilitation program. The different results could be a consequence of the different measures used and how the instruments were calibrated.<sup>27</sup> That is, response scores of 3.0 on scales ranging from 1 to 5 with points that correspond to differently worded responses (ie, from *not at all important* to *very important*,<sup>24</sup> from *never* to *very often*,<sup>10</sup> and from *strongly disagree* to *strongly agree*) alter the meaning of the results and possibly the conclusions. In addition, the different results could be due to the year<sup>9</sup> or country<sup>10,24</sup> in which the study was conducted. Changes have certainly occurred since the early 1990s in the United States, resulting in a greater willingness and openness to use psychological skills, whereas societal acceptance of psychological skills for use in athletic injury rehabilitation settings in other countries may not be as high. Thus, the overall positive attitudes toward psychological skills found in this study could be a result of practitioners' exposure to their educational training and athletes who use psychological skills for performance enhancement. This exposure could lead to an interest in gaining knowledge about techniques that would be employable within the rehabilitation program.

We also found that both ATs and PTs who reported having formal training and those who reported an intention to gain such training held more positive attitudes on the use of psychological skills with injured athletes. A positive attitude likely stems from educational preparation and experience using the techniques with injured athletes. Continued education for practitioners and continued research on the effectiveness of such techniques eventually may help ATs and injured athletes to simultaneously manage the mental trauma associated with the physical injury.

We asked ATs to report their educational experience as either graduating from an accredited program or not graduating from an accredited program; we found no difference between the groups. These findings highlight a potential disconnection between the educational standards employed by an accredited program and the actual student outcomes. We assumed that readers would ask, "What about more-recent graduates?" Intuitively, more-recent graduates of accredited programs, those that followed a revised set of educational standards, may have different attitudes, norms, and behaviors than graduates of older accredited programs (dating back to the early 1990s).

However, 2 groups of graduates (0–5 years ago and 0–10 years ago) showed no effect of educational standards related to formal education on psychological skill integration with injured athletes. We believe that this lack of formal education or the perception of not receiving ample education may be connected to the use of mental imagery and other psychological tools to assist injured athletes.

The accreditation of athletic training education programs by the Commission on Accreditation of Allied Health Education Programs and, more recently, the Commission on Accreditation of Athletic Training Education, provides academic programs with a set of psychosocial intervention and referral competencies; these ensure that students are receiving instruction and evaluation on the psychological aspects of sport injury. More specifically, one of the educational competencies requires the student to "[d]escribe the basic principles of mental preparation, relaxation, visualization and desensitization techniques."<sup>22</sup> Students are required to "[d]emonstrate the ability to select and integrate appropriate motivational techniques into a patient's treatment or rehabilitation program. This includes, but is not limited to, verbal motivation, visualization, imagery, and/or desensitization."<sup>22</sup> To reiterate, it is clearly within the professional and educational preparation of the athletic training student to possess knowledge of mental imagery and other psychological skills geared to aid in the rehabilitation of injured athletes. What may be missing, however, is the practical experience of implementing the mental skills with athletes who are undergoing injury rehabilitation. Confidence in the ability to perform a task is built through clinical practice, which is an underpinning of the accredited athletic training education program. Educational and clinical preparation related to psychological skills is essential; most sports medicine practitioners lack access to sport psychologists to aid the injured athlete.<sup>20,26</sup> Unlike ATs, the education of PTs does not include this set of specific psychosocial competencies. Thus, the preparation of the 2 professions may be vastly different when considering the use of psychological interventions within sport injury rehabilitation programs.

The educational and clinical background of the PT may assist in the explanation for the aforementioned results regarding attitudes toward the effectiveness of mental imagery during the rehabilitation of the athlete. For example, CAPTE does not include specific clinical psychology coursework as a component of professional education for the PT.<sup>23</sup> Although CAPTE does require the behavioral sciences as a didactic component of the professional educational foundation, specific training in the direct interventions of mental imagery and mental practice is not required. In addition, the *Guide to Physical Therapist Practice*<sup>24</sup> does not include mental imagery or mental practice techniques as a type of direct intervention that PTs can provide to their patients. However, PTs have demonstrated the use of mental imagery techniques as an effective intervention in the rehabilitation of patients with neurologic deficits.<sup>28,29</sup> Despite the focus on neurologic deficits in these investigations, the authors demonstrated the potential positive implications for the use of mental imagery within an athletic population that required physical therapy intervention.

In conclusion, the attitudes of ATs and PTs seemingly have changed regarding the effectiveness of psychological

tools for rehabilitation. As recently as 2000, research<sup>10</sup> suggested that injury rehabilitation specialists may have had negative attitudes toward using mental imagery and relaxation techniques with injured athletes. The positive attitudes held by both ATs and PTs in our study are promising and have implications for improving the rehabilitation process for the injured athlete. We recommend that the practitioners who lead the rehabilitation programs of injured athletes and the educators who teach future ATs remain educated on the up-to-date methods and tools associated with a successful recovery.

Education plays a vital role in the preparedness of the AT and PT to care for the injured athlete. At present, the learning goals of an accredited program (regarding the implementation of psychological skills within rehabilitation) seem to be disconnected from the outcomes; additional education may help ATs to become more knowledgeable and confident in using mental skills with injured athletes. Educational standards and clinical proficiencies that guide the education of the athletic training student should be evaluated for implementation within professional practice (eg, 5 years postcertification) to truly establish the effectiveness of such education. Consistent with past research,<sup>20</sup> our findings call for the development of continuing education opportunities for ATs who lack training within this competency; such opportunities may be the key to promoting the use of psychological skills with injured athletes. These offerings should be research-based practical applications and suitable for both ATs and PTs.

Although our survey identified interest in gaining the knowledge and skills necessary to use psychological skills in a majority of ATs and PTs, the educational opportunities are not abundant. Physical therapists do not receive formal education in the use of psychological skills for rehabilitation and rely solely on continuing education opportunities to gain knowledge. If the positive attitudes surveyed in our study are to take form as better care for the athlete, continuing education opportunities must match the desire for further knowledge.

In summary, psychological skills have been shown to benefit the injured athlete by promoting and maintaining a positive mind set, focusing on healing occurring within the injured body part, and decreasing stress and anxiety through positive visualizations and self-talk.<sup>8,17,18</sup> The aforementioned cognitive outcomes of imagery relate to 2 important behavioral factors: higher adherence rates and faster recovery from sport injury.<sup>18</sup> These behavioral outcomes continue to be problematic for those working with injured athletes, and further investigation on identifying useful tools for improving rehabilitation is warranted.

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*Address correspondence to J. Jordan Hamson-Utley, PhD, ATC, Health Promotion and Human Performance, 2801 University Circle, Ogden, UT 84408-2801. Address e-mail to j.hamson-utley@unt.edu.*