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An Evaluation of an Educational Intervention in Psychology of Injury for Athletic Training Students

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Context: "Psychosocial Intervention and Referral" is 1 of the 12 content areas in athletic training education programs, but knowledge gained and skill usage after an educational intervention in this area have never been evaluated.

Objective: To evaluate the effectiveness of an educational intervention in increasing psychology-of-injury knowledge and skill usage in athletic training students (ATSs).

Design: Observational study.

Setting: An accredited athletic training education program at a large Midwestern university.

Patients or Other Participants: Participants included 26 ATSs divided into 2 groups: intervention group (4 men, 7 women; age = 21.4 ± 0.67 years, grade point average = 3.37) and control group (7 men, 8 women; age = 21.5 ± 3.8 years, grade point average = 3.27).

Data Collection and Analysis: All participants completed the Applied Sport Psychology for Athletic Trainers educational intervention. Psychology-of-injury knowledge tests and skill usage surveys were administered to all participants at the following intervals: baseline, intervention week 3, and intervention week 6. Retention tests were administered to intervention-group participants at 7 and 14 weeks after intervention. Analysis techniques included mixed-model analysis of variance (ANOVA) and repeated-measures ANOVA.

Results: The Applied Sport Psychology for Athletic Trainers educational intervention effectively increased psychology-of-injury knowledge (29-point increase from baseline to intervention week 6; $F_{2,23} = 29.358$, $P < .001$, $\eta_p^2 = 0.719$) and skill usage (50-point increase from baseline to intervention week 6; $F_{2,23} = 5.999$, $P = .008$, $\eta_p^2 = 0.343$) in undergraduate ATSs. These increases were maintained at the 7-week and 14-week retention testing ($P < .001$ for both).

Conclusions: This first attempt at evaluating an educational intervention designed to improve ATSs' knowledge and skill usage revealed that the intervention was effective. Although both knowledge and skill usage scores decreased by the end of the retention period, the scores were still higher than baseline scores, indicating that the intervention was effective.

Key Words: psychosocial skills, competencies, proficiencies

Key Points

- The 6-week Applied Sport Psychology for Athletic Trainers educational intervention effectively increased psychology-of-injury knowledge and skill usage in athletic training students.
- Knowledge test scores increased the most between baseline and intervention week 3.
- Skill usage scores increased throughout the intervention period.
- Psychology-of-injury knowledge test scores and skill usage scores decreased by the end of the retention period but were still higher at the 14-week retention test than at the baseline test.

Because of frequent contact with injured athletes during injury recovery and rehabilitation, certified athletic trainers (ATs) are in a position to provide key psychosocial support. All ATs who have met entry-level standards must have had formal education and have demonstrated competency in the "Psychosocial Intervention and Referral" content area. However, although the National Athletic Trainers' Association Education Council standards require formal instruction in psychosocial intervention and referral, they provide no suggestions or requirements regarding how such competencies must be taught. This allows directors of athletic training education programs (ATEPs) to implement these competencies in any way that they choose, but that may be detrimental to athletic training students (ATSs).[1] Competency guidelines provided to ATEPs are general, and educational preparation regarding specific, practical application of psychology-of-injury knowledge that is relevant to athletic training is needed.

Injured athletes have identified effective ATs' communication skills as extremely important for establishing rapport with them; this rapport ensures prompt reporting of injuries and compliance with rehabilitation (J.L.S.-O. and D.R.G., unpublished data, 2008). Investigators[2–4] have recommended the development of effective communication and athlete education skills, particularly as a strategy for improving athlete adherence to a rehabilitation program, but researchers[5,6] have suggested that more effective communication between ATs and athletes is needed. Additionally, an understanding of individual motivation has been cited as one of the top strategies about which ATs should have knowledge[7]; however, many ATs are not being educated in this area,[1] and athletes have reported that motivation from ATs is lacking (J.L.S.-O. and D.R.G., unpublished data, 2008). In their study of injured athletes, Fisher and Hoisington[2] confirmed the underuse of motivation and adherence strategies in the athletic training room.

Table 1. Athletic Training Room Characteristics

Sports by Athletic Training Room	Approved Clinical Instructors	Juniors	Seniors	Total Athletic Training Students	Group
Football, tennis, field hockey	4	5	2	7	Control
Women's crew, men's and women's soccer, dance, women's volleyball, women's gymnastics, cheerleading, baseball, softball, men's and women's track and cross-country	4	4	5	9	Intervention
Men's ice hockey	1	1	0	1	Intervention
Wrestling, men's and women's swimming	2	0	2	2	Control
Women's basketball, men's and women's golf	2	2	0	2	Control
High schools 1 and 2	2	0	1	1	Intervention
High schools 3–5	3	0	4	4	Control

Social support provision and counseling and referral are among the psychosocial competencies within ATEPs.[8,9] Researchers[10–13] have demonstrated the powerful effects of AT-provided social support during injury rehabilitation, including its effects on the athlete's self-efficacy, anxiety level, compliance, belief in rehabilitation process, and perceived susceptibility to reinjury. Additionally, researchers have shown that 90% of ATs counsel athletes regarding injury-related problems, 77% counsel them regarding sport-related problems, and 65% counsel them regarding personal problems.[14] However, the consensus of the ATs in another study[1] was that their undergraduate ATEPs did not prepare them for this aspect of their professional duties. These ATs reported a lack of educational preparation and clinical practice in this area and, therefore, felt underprepared to handle psychosocial and referral situations they faced as ATs. This finding was consistent with other reports in the literature,[15,16] which revealed that most ATs surveyed (60%) felt unprepared or underprepared to detect psychological conditions, counsel athletes in many psychological areas, and make referrals to appropriate health care professionals.

The course of rehabilitation is not always consistent, and psychological factors involved with injury response may influence treatment compliance and rehabilitation performance in many ways.[17,18] Several psychological interventions have been recommended to increase adherence to rehabilitation protocols and to facilitate the physical rehabilitation of injured athletes (eg, relaxation, visualization and imagery, and goal setting). Training in the use of these mental skills has been included in the "Psychosocial Intervention and Referral" sections of both the third and fourth editions of the National Athletic Trainers' Association's *Athletic Training Educational Competencies*.[8,9]

Although competencies related to communication, adherence, motivation, social support, counseling and referral, and mental skills are included in the competency matrices,[8,9] we know little about how they can be taught to ATSs. In a search of the literature, we found no course evaluation in applied sport psychology for ATs. The purpose of our study was to evaluate the effectiveness of a 6-week educational intervention at increasing psychology-of-injury knowledge and skill usage in ATSs.

METHODS

An intervention-group versus control-group design was used. However, ATSs were assigned to their Approved Clinical Instructors (ACIs) before the start of the study, so a traditional, simple randomization of participants to groups was not possible because of the potential for cross-group contamination. Specifically, we assumed that participants assigned to the control group and working in the same athletic training rooms daily with intervention-group participants would be exposed to the skills being taught in the educational intervention. Such contamination would effectively extinguish the control group. For this reason, we used a group-allocation design, which is also called composite-randomization design or cluster-randomization design.[19] In our study, individual athletic training rooms ($n = 7$) were purposefully assigned to intervention or control groups based on the academic class of the ATSs and types of sports teams using each athletic training room (Table 1). This type of design is appropriate when the unit of comparison is not the individual but is the group.[19] In our study, we were comparing intervention and control groups.

Participants

A convenience sample of ATSs from the proficiency course of 1 ATEP at 1 large Midwestern university was invited to participate in this study. Twenty-six of the 27 ATSs (96%) were enrolled; 1 ATS chose not to participate. Participants were assigned to either the intervention group (4 men, 7 women; age = 21.4 ± 0.67 years, grade point average = 3.37) or the control group (7 men, 8 women; age = 21.5 ± 3.8 years, grade point average = 3.27). Athletic training room characteristics are described in Table 1. A post hoc power analysis ($1 - \beta$) indicated that the sample size and output effect sizes produced a statistical power level of 0.6015. All participants provided informed consent, and the study was approved by the Institutional Review Board of Michigan State University. This study was carried out between August 2007 and January 2008.

The Applied Sport Psychology for Athletic Trainers Educational Intervention

The Applied Sport Psychology for Athletic Trainers (ASP-AT) educational intervention was designed to mirror how this course might be implemented in a typical ATEP. We assumed that most ATEPs do not have room within their curricula for another full course. Therefore, this intervention was designed to be incorporated into whatever course the ATEPs are using to fulfill the Education Council's competency on "Psychosocial Intervention and Referral" (eg, a proficiency course, a unit in an evaluation

course, or a sport psychology course). The intervention was designed to last 6 weeks: 2-hour classroom sessions once a week for 3 weeks followed by 30-minute seminar sessions once a week for 3 weeks. The classroom sessions were structured with a combination of lectures, active student participation, and student interaction activities (eg, goal-setting worksheets). The seminar sessions were designed to enable participants to consult with the instructor, to share their experiences implementing techniques with athletes, to learn from others' experiences, and to receive feedback regarding how to address challenges that they were facing. Each seminar session began with a review of course material and with participants describing ways they had found to implement techniques over the past week. Participants were required to attend at least 2 of 3 two-hour classroom sessions and 2 of 3 thirty-minute seminar sessions to remain in the study (Table 2). The ASP-AT content was based on a critical review of the literature, data from pilot studies with injured athletes and recently certified ATs[1] (J.L.S-O. and D.R.G., unpublished data, 2008), "Psychosocial Intervention and Referral" competency guidelines,[8] personal experience of the authors, and suggestions from experts within the field. The instructor of the ASP-AT had been certified as an AT for 5 years and was a third-year doctoral student in sport psychology with specific experience and training in sport psychology's application to athletic injury.

Table 2. Schedule of Intervention-Group Course Content

Session	Major Topic Area
Classroom session 1	Three key areas of psychology-of-injury research
	Communication in the athletic training room
	Facilitating rehabilitation compliance
Classroom session 2	Social support in the athletic training room
	Motivational strategies
Classroom session 3	Introduction to psychological skills training
	The certified athletic trainer as a counselor
Seminar session 1	Open-floor discussion
	Self-check: interpersonal skills, goal setting
Seminar session 2	Open-floor discussion
	Self-check: psychological skills training
Seminar session 3	Open-floor discussion
	Self-check: what did you learn?

Instrumentation

We used a 28-item knowledge test (KT) and a 34-item Likert scale (6 subscales) skill usage survey (SUS). The KT was designed to evaluate whether participants were learning the content of the ASP-AT intervention (sample item: *List two strategies for dealing with noncompliant or difficult athletes.*). The purpose of the SUS was to evaluate whether participants were using the skills, techniques, and strategies learned in the ASP-AT intervention during their interactions with injured student-athletes (sample item: *I teach and encourage my athletes to use relaxation techniques during injury and rehabilitation.*). The KT was evaluated by a panel of 3 ATs with 14 combined years of experience, 1 Association for Applied Sport Psychology-certified sport psychology specialist with more than 30 years of experience, and 1 AT and sport psychology specialist with 8 years of experience. Additionally, 3 ATs who were not associated with this study participated in an ASP-AT pilot course and then took the KT. Modifications and clarifications to the test were made based on suggestions solicited. The SUS underwent factor analysis with 215 ATSs who were not associated with this study. Reliability coefficients (subscale range, 0.716–0.894) and internal consistency (Cronbach α subscale range, 0.657–0.894) for the SUS were demonstrated based on this pilot testing.[20]

Testing Procedures

When intervention or control groups were assigned, all participants took a precourse KT and SUS. Scores on these 2 instruments served as preintervention baseline scores. Seven days after the third classroom session (week 4), the KT and SUS were administered again to participants in both groups. Participants in the intervention group were encouraged to study for the tests in the same way that they would study for any test within their athletic training major. Although participants in the control group were aware of the test date, they were instructed not to prepare for the tests in any way. The rationale for these instructions was to maintain the integrity of the control group. Athletic training students who were not involved in our study would generally not study sport psychology daily, and the control group in our study served to simulate typical ATSs. Seven days after the third seminar session (week 7), the KT and SUS were administered again to the intervention and control groups. Again, intervention-group participants were encouraged to prepare as they would for any test in a course within the athletic training major, whereas control-group participants were instructed not to prepare for the tests in any way. After completing the tests, the intervention group was reminded that, although their participation in the weekly sessions was complete, they would be asked to take the KT and SUS again to assess retention. Retention tests were administered 7 and 14 weeks after the completion of the ASP-AT intervention. The design of this study is summarized in Table 3. Student participation was voluntary, and no external motivation (ie, course grade) was given to study for follow-up tests or to encourage students to implement skills with injured athletes.

Although we intended to make the ASP-AT module practical, we incorporated research into the course materials to demonstrate to participants that the information was based on sound research studies, just as is the information they receive in their evaluation, modalities, and rehabilitation courses. Participants were provided with a "toolbox" of in-class activities and were required to complete 7 out-of-class assignments and to journalize about the successes or challenges of implementing in-class techniques with athletes in real-world settings. The 30-minute seminar sessions simulated how this module would be implemented in a true ATEP setting because ATSs could ask follow-up questions to the instructor during the academic semester.

Statistical Analyses

Several data analyses were calculated to evaluate the effectiveness of the ASP-AT intervention at increasing psychology-of-injury knowledge and skill usage in the intervention group as compared with the control group. A

Table 3. Study Design and Assessment Timeline

	Assessment Timeline						
Group	Baseline	Weeks 1–3	Week 4	Weeks 4–6	Week 7	Week 14 (Retention Week 7)	Week 20 (Retention Week 14)
Intervention	Knowledge test Skill usage survey	Classroom sessions	Knowledge test Skill usage survey	Seminar sessions	Knowledge test Skill usage survey	Knowledge test Skill usage survey	Knowledge test Skill usage survey
Control	Knowledge test Skill usage survey		Knowledge test Skill usage survey		Knowledge test Skill usage survey		

2 (group) × 3 (time) mixed-model analysis of variance (ANOVA) was calculated to evaluate group differences for each dependent variable (KT, SUS). Although participants were divided into 7 athletic training rooms, each participant worked with a different ACI or set of ACIs, thus preventing interdependence of participants and upholding one of the primary assumptions. Although these ACIs were aware that their ATSs had been invited to participate in this study, the ACIs had no formal role in the study and were not provided with an outline of the course content.

A mixed-model ANOVA was conducted to compare group scores on the KT at baseline, intervention week 3, and intervention week 6. When the sphericity assumption was violated, we used the Huynh-Feldt correction. To examine the pattern of change over time, a trend analysis was conducted. Pairwise comparisons were calculated to identify differences at each time. A mixed-model ANOVA was also calculated to compare group SUS scores at baseline, at intervention week 3, and at intervention week 6. Finally, to evaluate retention over time, pairwise comparisons were generated from repeated-measures ANOVA. All results were adjusted for multiple comparisons using Bonferroni correction. The α level was set a priori at .05. All data were analyzed with SPSS (version 16.0; SPSS Inc, Chicago, IL).

RESULTS

The means and SDs for the KT are presented in Table 4. The sphericity assumption was violated and necessitated the use of the Huynh-Feldt correction. We found a group × time interaction ($F_{2,48} = 45.558$, $P < .001$, $\eta_p^2 = 0.655$), with an inspection of the means indicating that the intervention effectively increased KT scores of the intervention group compared with the control group.

We found a linear trend for the intervention group, indicating that KT scores continued to increase from baseline to intervention week 6 (Figure 1). Pairwise comparisons demonstrated a time effect for baseline to intervention week 3 and for baseline to intervention week 6, indicating increases in intervention-group KT scores from baseline (both $P < .001$). However, we did not find a time effect for intervention week 3 to intervention week 6. All results reported were adjusted for multiple comparisons using Bonferroni correction.

Table 4. Knowledge Test Results by Group

Time	Group	Mean ± SD	n
Baseline	Control	13.933 ± 7.188	15
	Intervention	16.409 ± 8.420	11
	Total	14.981 ± 7.671	26
Week 3	Control	18.067 ± 7.314	15
	Intervention	42.455 ± 10.294	11
	Total	28.385 ± 14.944	26
Week 6	Control	16.344 ± 6.183	15
	Intervention	49.867 ± 12.860	11
	Total	32.565 ± 19.654	26

The means and SDs for SUS total are presented in Table 5. The sphericity assumption was again violated, necessitating the use of the Huynh-Feldt correction in interpreting output. For group SUS scores, we found a group × time interaction ($F_{2,48} = 6.198$, $P = .005$, $\eta_p^2 = 0.205$), with an inspection of the means indicating that the intervention was effective at increasing group SUS scores of the intervention group more than those of the control group.

We found a linear trend for the intervention group, indicating that skill usage increased in linear fashion from baseline through intervention week 6 (Figure 2). Pairwise comparisons demonstrated a time effect for all periods ($F_{2,23} = 18.677$, $P < .001$): baseline to intervention week 3 ($P = .002$), intervention week 3 to intervention week 6 ($P = .012$), and baseline to intervention week 6 ($P < .001$). This indicated that SUS scores increased at each follow-up period. All results reported were adjusted for multiple comparisons using the Bonferroni correction.

Because control-group KT and SUS results increased over time, a repeated-measures ANOVA was calculated for the control-group data at the 3 data collection periods. The KT scores did not change over time ($F_{2,28} = 3.086$, $P = .080$), and they did not increase at each period: baseline to intervention week 3 ($P = .184$), intervention week 3 to intervention week 6 ($P = .315$), and baseline to intervention week 6 ($P = .614$). Similar results were found for the SUS ($F_{2,28} = 2.928$, $P = .081$); SUS scores did not increase at each period: baseline to intervention week 3 ($P = .407$), intervention week 3 to intervention week 6 ($P = .999$), and baseline to intervention week 6 ($P = .156$).

Finally, as noted, we generated pairwise comparisons from a repeated-measures ANOVA to evaluate retention over time. Paired-samples statistics (means and SDs) for baseline, intervention week 6, retention week 7, and retention week 14 are presented in Table 6; pairwise comparisons are presented in Table 7. Overall, the intervention demonstrated a 13.6% decrease in KT scores at retention week 7 ($P = .162$) compared with KT scores at intervention week 6, but this represented a 241% increase in KT score from baseline ($P < .001$). Retention week 7 SUS scores did not decrease ($P = .999$) from intervention week 6 values, which represented a 128% increase in usage from baseline ($P = .001$). At retention week 14, the intervention group demonstrated a 39.1% decrease in KT scores ($P = .001$) compared with KT scores at intervention week 6; however, this still represented a 170% increase

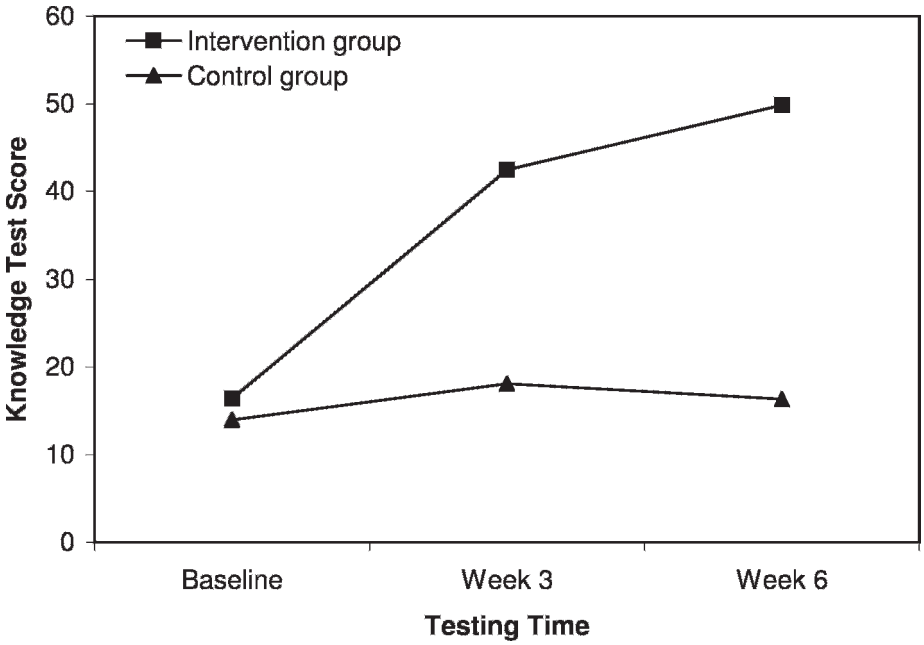

Figure 1. Group and time interactions for knowledge test.

from baseline ($P = .002$). Skill usage survey scores for the intervention group at retention week 14 decreased by only 1.1% ($P = .999$) compared with week 6, which represented a 25% increase from baseline SUS scores ($P = .001$). We did not collect retention week 7 or week 14 data from the control group for 2 reasons. First, because the KT and SUS scores in the control group during the intervention period did not increase, we believed asking control-group participants to take this test battery 2 more times was unnecessary. Second, we believed that the potential existed for a learning effect with the control group. The control group was instructed to take the KT and SUS at baseline, intervention week 3, and intervention week 6; 2 more KT assessments might have introduced an additional uncontrollable variable.

DISCUSSION

The ASP-AT intervention effectively increased psychology-of-injury knowledge and skill usage by intervention week 3, with continued improvement through intervention week 6. Although large increases in knowledge were expected at week 3 and week 6 of the intervention, the small KT score increase at intervention week 6 may be explained by the dramatic knowledge increase by intervention week 3. Individual intervention-group participants scored as high as 63.5 out of 73 points (average = 42.5 points on the 28-question KT) by intervention week 3. Additionally, although the increase in KT scores was small from intervention week 3 to intervention week 6, intervention-group scores continued to increase, but the change in control-group scores from baseline to intervention week 3 values and from baseline to intervention week 6 values was small. Although retention testing at week 7 and week 14 indicated that participants lost much of the knowledge they had initially gained (KT scores had decreased by 14% at retention week 7 and by 39% at retention week 14), retained psychology-of-injury knowledge was still much higher than baseline knowledge (average retained increase from baseline was 241% at retention week 7 and 170% at retention week 14). These retention values were consistent with findings in the general psychology literature, showing that knowledge recall decreased by 10.8% to 11.5% 1 week after initial knowledge gain[21,22] and by 45.5% after 16 weeks.[23]

Table 5. Skill Usage Survey Results by Group

Time	Group	Mean ± SD	n
Baseline	Control	202.400 ± 33.511	15
	Intervention	187.636 ± 28.158	11
	Total	196.154 ± 31.644	26
Week 3	Control	215.133 ± 34.309	15
	Intervention	217.364 ± 23.114	11
	Total	216.077 ± 29.566	26
Week 6	Control	217.800 ± 37.697	15
	Intervention	237.000 ± 17.578	11
	Total	225.923 ± 31.827	26

Two possible explanations for the increased KT scores among intervention-group participants are (1) concurrent coursework and (2) amount of time spent studying or reviewing course materials. In the ATEP participating in our study, the undergraduate course in psychosocial bases of physical activity, which includes a sport psychology component, is taken by junior-level ATSs. Therefore, the senior-level participants in our study had been exposed to some of the course material covered in the ASP-AT. However, the percentages of junior-level and senior-level ATSs were equal across the control and intervention groups (Table 1). Additionally, no junior-level ATS participating in our study was concurrently taking the psychosocial bases course. For this reason, the increased KT scores in the intervention group were not likely associated with other courses. We asked intervention-group participants to self-report study time (average = 28 minutes per follow-up test); however, we did not consider it to be an intervening variable in our study.

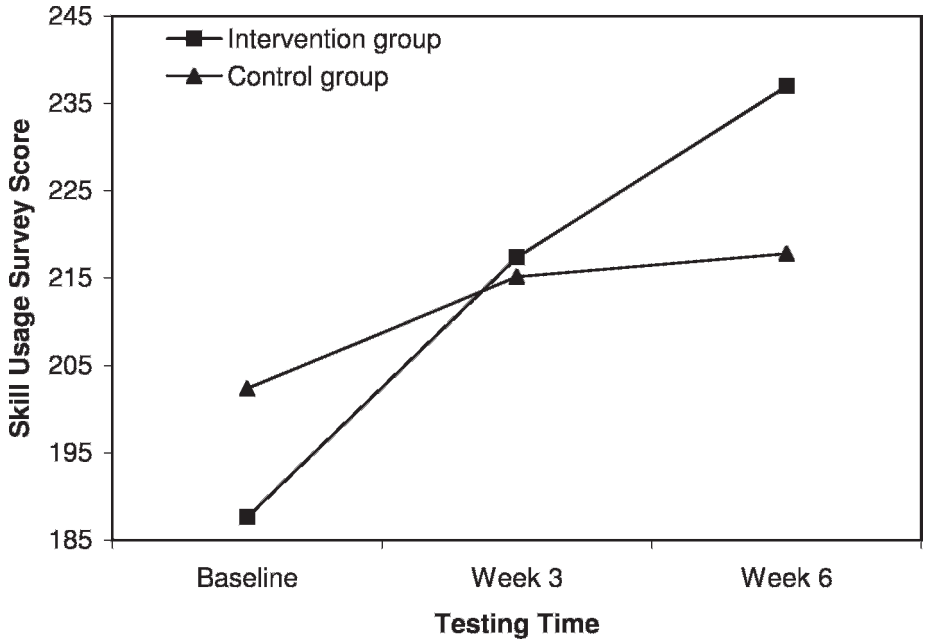

Figure 2. Group and time interactions for skill usage survey.

The similar mean grade point averages among control-group and intervention-group participants combined with the randomization of ATSs to control or intervention group would tend to prevent students with high academic (or intrinsic) motivation from forming a homogeneous intervention group. Although participants could not be singly randomized to groups, ATSs were randomly assigned to their ACIs (in terms of grade point average and academic motivation), thereby maintaining the effect of randomization.

Although increases in psychology-of-injury skill usage were not expected until intervention week 6, increases occurred by intervention week 3 and continued through intervention week 6. Retention testing indicated that participants continued using the skills with their athletes long after the module was complete; retention week 7 usage scores demonstrated an increase in skill usage, and retention week 14 scores demonstrated 98.9% retained usage. Participants also increased their skill usage compared with baseline usage (average retained increase from baseline was 21.6% at retention week 7 and 19.6% at retention week 14). To our knowledge, retained skill usage has not been examined previously.

Table 6. Knowledge Test and Skill Usage Survey Descriptive Statistics (n = 11)

	Time	Mean ± SD
Pair 1	Knowledge baseline	16.409 ± 8.420
	Knowledge retention week 7	39.636 ± 11.446
Pair 2	Knowledge week 6	45.864 ± 11.815
	Knowledge retention week 7	39.636 ± 11.446
Pair 3	Knowledge baseline	16.409 ± 8.4197
	Knowledge retention week 14	27.909 ± 11.122
Pair 4	Knowledge week 6	45.864 ± 11.815
	Knowledge retention week 14	27.909 ± 11.122
Pair 5	Usage baseline	187.636 ± 28.158
	Usage retention week 7	240.000 ± 19.698
Pair 6	Usage week 6	237.000 ± 17.578
	Usage retention week 7	240.000 ± 19.698
Pair 7	Usage baseline	187.636 ± 28.158
	Usage retention week 14	234.455 ± 23.278
Pair 8	Usage week 6	237.000 ± 17.578
	Usage retention week 14	234.455 ± 23.278

In a review of the literature, we found 2 other studies in which researchers attempted to evaluate the effectiveness of a course in sport psychology for ATs. In 1 course, the investigators[24] assessed only the perceptions and attitudes of participants after the course; we conducted a precourse-to-postcourse evaluation of knowledge gained. The other course was a workshop at the regional conference of the Eastern Athletic Trainers' Association (EATA).[25] Workshop content included antecedents to injury, emotional response to injury, athletes' pain perception, and applied sport psychology in injury rehabilitation. The author created a 28-item sport psychology KT (psychometric properties were not provided) and reported a 43% increase from baseline sport psychology knowledge. In our study, participants maintained knowledge increases of 170% at 14 weeks after intervention. Additionally, Pero[25] did not have a 100% response rate on follow-up testing in the EATA workshop; therefore, we cannot fully trust that the course increased knowledge by an average of 43%, as we cannot know how much knowledge was gained by participants who were lost to follow-up. Another major concern of this study was the potential for selection bias. The format of the EATA workshop required ATs to pay to participate; therefore, it is likely that only ATs who were interested in and agreed with the content of the workshop would have enrolled.[25] In our study, 96% (26 of 27) of eligible participants were enrolled, and all participants who completed the 6-week course returned for follow-up retention testing.

Limitations

Our study had several limitations. Although 26 of 27 eligible participants from the ATEP were enrolled, 26 is a

Table 7. Pairwise Comparisons From Repeated-Measures Analysis of Variance for Knowledge Test and Skill Usage Survey[a]

	Mean	SEM	95% Confidence Interval of the Difference (Lower, Upper)	*P* value
Knowledge test				
Baseline to retention week 7	−23.227	2.519	−31.483, −14.972	<.001
Week 6 to retention week 7	6.227	2.407	−1.659, 14.114	.162
Baseline to retention week 14	−11.500	2.185	−18.659, −4.341	.002
Week 6 to retention week 14	17.955	2.835	11.637, 24.271	.001
Skill usage survey				
Baseline to retention week 7	−52.364	8.275	−79.480, −25.247	.001
Week 6 to retention week 7	−3.000	4.197	−12.352, 6.352	.999
Baseline to retention week 14	−46.818	7.893	−72.684, −20.953	.001
Week 6 to retention week 14	2.545	5.343	−11.836, 16.927	.999

[a] Adjustment for multiple comparisons using Bonferroni correction.

small sample size for statistical analysis. Additionally, all participants were recruited from the same ATEP and, therefore, were more similar to each other than to participants from other ATEPs. Finally, the course was implemented by 1 instructor who was an expert in sport psychology's application to athletic training; therefore, the effectiveness of this module as taught by an ATEP instructor not trained extensively in these techniques cannot be substantiated.

Future Research Directions

In future studies, researchers should make every effort to obtain feedback from an injured athlete population or from ACIs who supervise ATSs, so they can gather more-objective feedback regarding the appropriateness of skill usage in practical settings. Evaluating the effect of this educational intervention in a true classroom setting would also be interesting. As noted, students voluntarily participated, and they were not given external motivation to study for follow-up tests or encouragement to implement skills with injured athletes. One could theorize that the effect of this educational intervention would be even greater if students were graded on the amount of knowledge gained and clinically evaluated on the appropriateness of skill usage. In future research, investigators should also focus on ways to increase retention levels of participants, perhaps using student-friendly technology, such as text message boosters, or developing a self-monitored or supervisor-monitored clinical evaluation and feedback system.

Finally, conducting a longitudinal study within 1 ATEP (or small subset of ATEPs) on ATSs' success rate on the "Psychosocial Intervention and Referral" component of the Board of Certification examination would be interesting. The success rate could be retrospectively recorded for ATSs who took the examination before the ATEP's implementation of this educational module and could be prospectively recorded after implementation of the module to evaluate how participation affects ATSs' success rate on the examination. Such a study would be the ultimate evaluation of the practical effectiveness of the ASP-AT educational intervention.

CONCLUSIONS

Our study demonstrated that the 6-week ASP-AT educational intervention effectively increased psychology-of-injury knowledge and skill usage in ATSs. Participants spent only 6 hours in classroom sessions, implying that ATEP instructors would have to dedicate only 6 hours of class time during a semester to a unit on psychology of injury to gain similar knowledge and skill usage increases in their students. One major contribution of our study to the relevant literature is the longitudinal nature of the follow-up testing. Participants were followed for 14 weeks after intervention. Although both KT and SUS scores decreased by the end of the retention period, these decreased scores still represented increases from baseline values.

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