College Athletic Trainers' Perceptions of Rest and Physical Activity When Managing Athletes With a Sport-Related Concussion

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Context: Cognitive and physical rest are commonly utilized when managing a sport-related concussion (SRC); however, emerging research now suggests that excessive rest may negatively impact recovery. Despite current research recommendations, athletic trainers (ATs) may be behind in implementing this emerging research into clinical practice. **Objective:** To assess college ATs' perceptions and implementation of an emerging SRC management approach (cognitive and physical rest and activity). **Design:** Cross-sectional study. **Setting:** Survey. **Participants:** A total of 122 (11.8%) ATs (53.3% female; 10.8 [9.8] y experience; 8.7 [6.9] SRCs managed annually) responded to the survey, which was randomly distributed to 1000 members of the National Athletic Trainers' Association, as well as 31 additional ATs from varying universities. **Main Outcome Measures:** A 5-point Likert scale assessed the ATs' perceptions and clinical practices as they relate to specific athlete behaviors (ie, texting, sleeping). The ATs were asked about their willingness to incorporate physical activity into clinical practice. **Results:** Playing video games (95.9%) and practicing (93.4%) were the activities most perceived to extend SRC recovery. However, sleeping more than usual (7.4%) and increased time in a dark environment (11.5%) were viewed as less likely to extend recovery. ATs restricted practicing (98.4%) and working out (91.8%) for athletes with SRC, while sleeping more than usual (6.6%) and increased time in a dark environment (13.1%) were less restricted. About 71% of the ATs would implement light physical activity for athletes with a symptom score of 1 to 5, 31% with scores of 6 to 10, and 15% with scores of 11 to 20. About 43%, 74%, and 97% believe that light, moderate, and vigorous physical activity, while symptomatic, will extend recovery, respectively. **Conclusions:** The ATs were receptive to including light physical activity into their SRC management, although only in certain situations. However, most ATs' beliefs and clinical practices did not completely align with emerging research recommendations for the management of SRCs.

Keywords: cognitive activity, concussion recovery, evidence-based practice, unlearning

Sport-related concussions (SRC) are a major health concern due to their high prevalence and potential for serious health impacts. Athletes with an SRC may present with neurocognitive impairments, balance deficits, and various symptoms associated with the injury.¹ Despite these health impairments, significant recovery has been reported to occur in as little as 2 weeks.^{2,3} However, up to 15% of athletes with an SRC may experience a protracted recovery lasting longer than 30 days.⁴ In an effort to combat this protracted recovery, cognitive and physical rest have often been utilized when managing athletes with an SRC.

Previous consensus statements for the management of SRCs recommend cognitive and physical rest until completely asymptomatic, followed by a graded return to activity.⁵ This rest is believed to ease discomfort, minimize energy demands, and prevent further insult to the brain.^{6,7} However, emerging research has challenged this concept of rest, suggesting that, in excess, it may be detrimental to SRC recovery.^{8,9} The over-promotion of rest may increase the likelihood of sedentary activities in athletes, such as sleeping more than usual or complete avoidance of mental stimulation. Researchers who have challenged prolonged rest have reported a faster recovery following just 2 days of rest, as opposed to 5 days.⁸ A study yielding similar results found that participation in exercise within 7 days postinjury improved postconcussion symptom reporting.⁹ The idea of limiting rest has been adopted by the

most recent version of the consensus statement on concussion in sport, which now suggests a shorter, more controlled period of cognitive and physical rest (24–48 h), followed by reincorporation into daily cognitive and physical activities (without exacerbating symptoms).¹ This new standard of care for managing athletes with an SRC challenges years of previous clinical practices employed by athletic trainers (ATs).

The ATs and other healthcare professionals are expected to utilize current and successful research evidence when making clinical decisions to optimize patient care.¹⁰ However, the process of implementing new and emerging research into clinical practice has several barriers and may take years to fully integrate.¹¹ These barriers may often result in clinicians practicing techniques that are supported by outdated research evidence. Previously identified barriers to implementing new research findings into clinical practice include a lack of time and resources.^{12,13} While these may be significant barriers for some healthcare providers, it is crucial that ATs are staying informed on emerging research findings, such as limiting excessive rest after SRC and promoting earlier physical activity involvement. In conjunction with this research awareness, clinicians must also be open to modifying their current clinical practices to incorporate new techniques. However, with the recent changes to SRC management, some ATs may lack awareness or do not incorporate these recommendations. Therefore, the purpose of the current study was to assess college ATs' perceptions and implementation of an emerging SRC management approach (cognitive and physical rest and activity).

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Methods

Participants

A sample of 1000 certified college ATs were randomly selected and contacted via electronic mail through the National Athletic Trainers Association. However, due to a low response rate from these National Athletic Trainers Association members, an additional 31 college ATs were randomly found through their universities' website and asked to complete the survey. Specifically, this process was done at the midpoint of the data collection by using Google's random number generator to select 5 numbers that corresponded to universities from the National Collegiate Athletic Association's active members online directory.¹⁴ Once identified, every AT listed on the university website was sent an email requesting participation in the survey. Participants were excluded from the study if they did not respond or failed to answer every question included in the survey. All participants were made aware of the minimal risk for participating and were asked for informed consent prior to beginning the online survey. The responses were kept anonymous and stored on a password-protected computer. The current study was approved by the Michigan State University institutional review board prior to survey distribution.

Instrument

The AT survey utilized the online Qualtrics Platform (Qualtrics Inc, Provo, UT) and consisted of 50 total questions. This survey was broken down into following 3 main sections: (1) demographics, (2) clinical SRC beliefs and practices as they relate to specific athlete activities, and (3) perceptions of utilizing rest and activity (cognitive and physical) for athletes with an SRC. The survey took approximately 15 minutes to complete, and the participants could go back and change their answers if desired.

The survey included a comprehensive demographic section, which included the following: age, sex, job setting, job title, years of AT experience, and average number of SRCs managed. The clinical SRC beliefs and practices section included several activities that a college student-athlete may participate in during a normal day. The ATs were first asked if they believed certain activities would extend recovery time, then whether they clinically restricted these activities when managing athletes with an SRC. For example, they were asked, "Do you believe the following activities will result in longer recovery time following SRC diagnosis?" and "Do you clinically restrict the following activities." Some of the activities included were device usage, (eg, computer, cell phone, video games, etc), socializing habits (eg, hanging out with friends, driving, going to the mall, etc), physical and cognitive activities (eg, walking, biking, working out, reading, going to class, etc), and sedentary habits (eg, sleeping more than usual, sleeping less than usual, spending time in a dark environment, etc). The utilization section included several statements regarding AT perceptions of rest (eg, physical rest should be utilized until concussion symptoms fully resolve), cognitive activity (eg, cognitive activity should not begin until asymptomatic), and physical activity (ie, physical activity should not begin until asymptomatic). A 5-point Likert scale determining level of agreement was utilized (1: strongly disagree to 5: strongly agree) to assess ATs' perceptions and clinical practices.

When developing the survey, content and face validity were established by 20 certified ATs, concussion researchers, and sports medicine professionals. These expert panel members were asked to

rate question clarity and appropriateness on a 5-point Likert scale (1 [being not appropriate], and 5 [being appropriate]). The questions remained part of the survey if they averaged a score of 3 or greater from the expert panel. During this validation process, the expert panel could provide open feedback for every question in the survey. All necessary changes to the survey were completed prior to distribution. The final survey version yielded a Cronbach alpha of .91.

Procedure

College ATs received an email with the Qualtrics survey link, asking for their voluntary participation in the study. Informed consent was included on the first question of the survey, and the participants were unable to proceed without giving their consent. The ATs could withdraw from the study at any point by exiting the survey and could skip individual questions without penalty. The survey remained open for approximately 6 weeks, with a reminder email being sent at the midpoint of the data collection.

Data Analysis

All responses were retrieved from the Qualtrics platform and downloaded into SPSS (version 24.0; IBM Corp, Armonk, NY). Descriptive statistics were reported, along with frequencies to assess AT perceptions of specific athlete behaviors, as well as the ATs' clinical practices. Frequencies were also calculated for the utilization section, as it relates to rest, cognitive, and physical activity.

Results

A total of 122 (57 males, 65 females, 33.6 [10.3] y) college ATs completed the survey, yielding a response rate of just over 11.83%. The respondents averaged 10.8 (9.8) years of AT experience and represented a variety of college settings (Table 1). The majority of the respondents had a master's degree ($n = 96$, 78.7%), with 22 (18.0%) and 4 (3.3%) reporting a bachelor or doctorate degree, respectively. The ATs reported managing an average of 8.72 (6.9) SRCs per academic year. All respondent characteristics can be found in Table 1. The ATs believed that long-term athlete care ($n = 30$, 24.6%), return-to-learn decision making ($n = 28$, 23.0%), and on-field evaluation ($n = 22$, 18.0%) were the most difficult aspects of managing athletes with an SRC, while off-field evaluation ($n = 4$, 3.3%), providing acute care ($n = 5$, 4.1%), and return-to-play decision making ($n = 9$, 7.4%) were viewed as least difficult.

When assessing which activities ATs believe are detrimental to SRC recovery, 17 common athlete activities were presented. Of the activities listed, ATs most commonly agreed or strongly agreed that playing video games ($n = 117$, 95.9%), participating in practice ($n = 114$, 93.4%), computer usage ($n = 113$, 92.6%), and watching television ($n = 105$, 86.1%) would extend SRC recovery time. Conversely, fewer ATs agreed or strongly agreed that sleeping more than usual ($n = 9$, 7.4%), increased time in a dark environment ($n = 14$, 11.5%), going on leisurely walks ($n = 20$, 16.4%), and spending time with friends ($n = 41$, 33.6%) would extend SRC recovery time.

Next, the ATs were asked if they clinically restricted the 17 daily activities when managing athletes with an SRC. The activities most commonly restricted by the ATs were participating in practice ($n = 120$, 98.4%), working out ($n = 112$, 91.8%), going

Table 1 Athletic Trainers Demographics by Sex, Work Setting, and Job Title (N = 122)

Characteristic	N (%)
Years of experience (mean [SD])	10.8 (9.8)
Sex	
Men	57 (46.7)
Women	65 (53.3)
Highest degree earned	
Bachelor	22 (18.0)
Master	96 (78.7)
Doctoral/terminal	4 (3.3)
Current work setting	
NCAA DI	55 (45.1)
NCAA DII	20 (16.4)
NCAA DIII	29 (23.8)
NAIA DI	4 (3.3)
NAIA DII	3 (2.5)
Other	11 (9.0)
Current job title	
Director of sports medicine	7 (5.8)
Head athletic trainer	26 (21.3)
Associate athletic trainer	15 (12.3)
Assistant athletic trainer	62 (50.8)
Intern athletic trainer	5 (4.1)
Graduate assistant athletic trainer	6 (4.9)
Other	1 (0.8)

Abbreviations: DI, Division I; DII, Division II; DIII, Division III; NAIA, National Association of Intercollegiate Athletics; NCAA, National Collegiate Athletic Association.

for a run ($n = 111$, 90.9%), and playing video games ($n = 114$, 93.4%). Conversely, the ATs were less likely to restrict sleeping more than usual ($n = 8$, 6.6%), increased time in a dark environment ($n = 16$, 13.1%), and going on a leisurely walk ($n = 31$, 25.4%). The results for all 17 activities can be found in Table 2.

For the final section of the survey, the ATs were given several statements and asked to respond with their level of agreement. As an athlete's initial postconcussion symptom score increased, the ATs were less likely to consider physical activity as a management strategy. Specifically, 71% of the ATs would consider using physical activity for an athlete with a postconcussion symptom score of 1 to 5, whereas only 15% of the ATs would consider this treatment for athletes with a symptom score of 11 to 20. When asked about utilizing different physical activity intensities, 97% of the ATs believed that vigorous activity should not begin until an athlete is asymptomatic. However, as the physical intensity level decreased, more ATs were in support of using physical activity in their SRC management practices. Additional results from this section of the survey can be found in Table 3.

Discussion

The current study evaluated college ATs' perceptions of utilizing physical activity, cognitive activity, and rest following an SRC. Overall, the ATs were found to be open to incorporating physical activity after SRC, however, only in certain situations (ie, low

Table 2 Athletic Trainers' Clinical Beliefs and Practices Regarding Specific Athlete Activities (N = 122)

Activity	AT agreeance, N (%)	
	Believe activity extends recovery	Clinically restrict activity
Texting	101 (82.8)	99 (81.1)
Watching TV	105 (86.1)	109 (89.3)
Computer usage	113 (92.6)	112 (91.8)
Playing video games	117 (95.9)	114 (93.4)
Time with friends	41 (33.6)	36 (29.5)
Leisurely walk	20 (16.4)	31 (25.4)
Leisurely run	96 (78.7)	111 (90.9)
Leisurely bike ride	89 (73.0)	97 (79.5)
Driving	70 (57.4)	75 (61.5)
Working out	95 (77.9)	112 (91.8)
Practicing	114 (93.4)	120 (98.4)
Watching practice	44 (36.1)	51 (41.8)
Going to class	81 (66.4)	64 (52.5)
Homework	94 (77.0)	75 (61.5)
Sleeping more	9 (7.4)	8 (6.6)
Sleeping less	92 (75.4)	68 (55.7)
Dark environment	14 (11.5)	16 (13.1)

Abbreviation: AT, athletic trainer.

Table 3 Athletic Trainers' Perceptions of Utilizing Rest and Activity (N = 122)

Statements	AT agreeance, N (%)
The following should not begin until asymptomatic:	
Light physical activity.	52 (42.6)
Moderate physical activity.	90 (73.8)
Vigorous physical activity.	118 (96.7)
I would consider light physical activity for athletes:	
With a symptom score of 1–5.	86 (70.5)
With a symptom score of 6–10.	38 (31.1)
With a symptom score of 11–20.	18 (14.8)
Regardless of neurocognitive score.	21 (17.2)
I do not want my athletes starting:	
Physical activity before being asymptomatic.	37 (30.3)
Cognitive activity before being asymptomatic.	27 (22.1)

Abbreviation: AT, athletic trainer.

symptom score and low physical activity intensity). In addition, this study provides insight into the specific activities that ATs believe will extend SRC recovery time. Electronic-based activities, such as playing video games, computer use, and watching TV, were believed to have a large influence on recovery time, while more sedentary activities, such as sleeping more than usual and

increased time in a dark environment, were perceived as less likely to impair SRC recovery. In addition, the ATs were most likely to restrict their athletes from practicing and going for a run, while only some ATs attempted to restrict sleeping more than usual and the amount of time an athlete spends in a dark environment.

Researchers have identified that most ATs tend to frame their concussion management practices around previously published consensus or position statements.^{15,16} In the newest version of the Consensus Statement on Concussion in Sport, experts state that after a 24- to 48-hour rest period, athletes should progress to greater physical activity levels, provided it does not exacerbate postconcussion symptoms.¹ This suggestion is supported by a number of recent research findings indicating that early postconcussion physical activity may improve recovery outcomes.^{17–19} However, the current study identified that 43% of the responding ATs believed that light physical activity should not begin until athletes are completely asymptomatic. In addition, 94% and 87% of the ATs did not attempt to limit the athletes from sedentary-based activities, like sleeping more than usual and time in a dark environment, respectively. These results suggest some inconsistencies between ATs' reported clinical practice and current best practices for the management of athletes with an SRC.¹

Similar to physical rest, cognitive rest is recommended during the first 24 to 48 hours after an SRC.^{1,20} This may include limiting activities, such as reading, screen time (ie, phone, television, and computer usage), or schoolwork. However, after the initial resting period, it is recommended that individuals gradually increase these cognitive tasks unless they exacerbate postconcussion symptoms. Furthermore, a gradual return-to-learn progression is outlined in the current literature.^{1,20} This gradual increase in cognitive activity conflicts with previous SRC management practices, which promoted as much cognitive rest as possible.⁵ The current study identified that greater than 82% of ATs believed that screen-time activities (texting, watching TV, computer usage, and playing video games) would extend postconcussion recovery. Similarly, over 81% of college ATs clinically restricted these activities. School-based activities (going to class and homework) were also heavily restricted by ATs (53% and 61%, respectively). Although these activities may warrant initial restriction, excessively limiting these activities may negatively influence SRC recovery, as well as cause athletes' academic performance to suffer. Therefore, to promote a more successful recovery, ATs must ensure they are utilizing treatment strategies that reflect the most currently available research findings.

When incorporating emerging research into clinical practice, clinicians must routinely appraise and adapt their clinical techniques to best reflect positive research findings. This process may challenge ATs who have seen success in their established clinical practices. The respondents for the current study averaged approximately 11 years of clinical experience; thus, to stay current with emerging SRC research, the respondents likely had to unlearn outdated habits, such as excessive rest and inactivity. This is due to early activity (cognitive and physical) being introduced more recently than the respondent's 11 average years of experience. Unlearning is defined as the process by which an individual acknowledges and releases prior learning to incorporate new information and behaviors.²¹ Significant time may be required for these old habits to be unlearned and for new techniques to form, thus potentially posing an immediate challenge for clinicians. In addition, fear of the unknown that accompanies unlearning can often deter clinicians from wanting to alter their management approaches. For example, clinicians who have had

success managing SRCs with excessive rest may find that transitioning to early physical and cognitive activity is difficult. Despite this reluctance, clinicians must ensure they are providing the best care possible for patients, regardless of these foreseeable challenges. However, unlearning is not the only barrier ATs face when modifying clinical practice to better reflect current and emerging research findings.

Previous research has aimed to identify other specific barriers that ATs may face when integrating new research concepts into clinical practice.^{12,13} Insufficient resources, time, and research knowledge have previously been identified as barriers that many healthcare professionals face when trying to incorporate research.^{12,13} Of these findings, little designated work time for reading, appraising, and implementing research has been cited most commonly.¹³ It is easy to see that, between patient care and other administrative responsibilities, research may not receive adequate attention from healthcare professionals. In addition, ATs with limited research accessibility were also less likely to implement new findings into their clinical practices.¹² This is particularly concerning because a significant amount of research on SRCs is published in restricted-access resources. Specifically, most of the research in favor of early activity after SRC has restricted accessibility.^{17,22,23} Therefore, clinicians must often wait for this information to be disseminated via other, less-restrictive means (ie, consensus statements, symposiums) or pay to access this necessary information. One suggested solution targeted at reducing these barriers is to hold weekly meetings with other ATs devoted strictly to discussing research with colleagues.²⁴ These meetings may include dissemination of new findings, strategies to better incorporate research, or aims to improve clinicians' general research knowledge. Structured work meetings offer a feasible solution to the time constraints previously cited by ATs.

Welch et al²⁴ interviewed ATs to identify other possible solutions to promote research into clinical practice. ATs believed that offering more processed research information, as well as offering focused workshops, would promote increased participation by clinicians.²⁴ Processed research information may take many forms, ranging from consensus and position statements to health informatics or other concise resources. The National Athletic Trainers' Association has made significant progress in providing ATs with resources that summarize emerging research and offer strategies to help improve clinical practice.²⁵ Moreover, succinct SRC position and consensus statements summarizing the best available research are available for clinicians and are updated on a routine basis.^{1,20} These resources may assist ATs in updating their SRC management practices to include early postconcussion cognitive and physical activity. Another strategy proposed by ATs was to incorporate more peer discussions and identify research mentors.²⁴ These strategies further support the idea of weekly research meetings among colleagues. Finally, ATs believed that through consistent repetition they could not only increase their research competence but start to see positive reflections in their clinical practice.²⁴ Regardless of these suggested strategies, clinicians should aim to consistently review emerging research, with the overall goal of providing the best patient care possible.

This study is not without limitations. Although several ATs were contacted to complete the survey, there was a relatively low response rate, of just over 11%. A larger sample would have allowed researchers to explore possible factors (ie, educational level, work setting) that may have influenced the results. In

addition, the 31 participants who were contacted from the 5 randomly selected Division I universities may have similar SRC management practices and beliefs. These similarities may have slightly skewed the results to reflect the beliefs present at their individual institution. The current study also did not assess the barriers ATs may be facing when trying to implement physical activity into their SRC management practices. Future research should attempt to identify these barriers, along with implementation strategies to help improve clinical practice.

Conclusions

Emerging research has found that cognitive and physical activity may improve SRC outcomes; thus, ATs may need to adjust their treatment strategies to better reflect these new research findings. The ATs included in this sample appeared receptive to incorporating light physical activity in their SRC management practices; however, this was only apparent in certain situations (ie, low symptom score). Interestingly, when asked about specific activities, the ATs believed that certain physical activities (ie, practicing, working out) contributed to a prolonged recovery, whereas more sedentary activities (ie, sleeping more than usual, time in a dark environment) were perceived as less likely to extend recovery time. The current study suggests a disconnect between ATs and emerging SRC best practices. As new research findings emerge, ATs should be diligent in seeking various resources, such as peers, a research mentor, or succinct research summaries (ie, consensus statements, informatics), to help improve clinical practices. A weekly research meeting with colleagues may significantly improve the rate at which new research is implemented into clinical practice. Utilizing emerging and successful research into clinical practice will ensure that patients are receiving the best care possible.

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