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Understanding Athletic Trainers' Beliefs Toward a Multifacted Sport-Related Concussion Approach: Application of the Theory of Planned Behavior

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Context: Practice guidelines recommend a multifaceted approach for managing concussions, but a relatively small percentage of athletic trainers (ATs) follow these recommendations. Understanding ATs' beliefs toward the recommended concussion practice guidelines is the first step in identifying interventions that could increase compliance. The theory of planned behavior (TPB) allows us to measure ATs' beliefs toward the recommended concussion practice guidelines.

Objective: To examine the influence of ATs' beliefs toward the current recommended concussion guidelines on concussion-management practice through an application of the TPB.

Design: Cross-sectional study.

Setting: A Web link with a survey was e-mailed to 1000 randomly selected members of the National Athletic Trainers' Association (NATA).

Patients or Other Participants: A total of 221 certified ATs working in secondary school/clinic, high school, and college/university settings.

Main Outcome Measure(s): A 66-item survey reflecting the current recommended concussion guidelines of the NATA and International Conference on Concussion in Sport was created to measure beliefs using the TPB constructs attitude toward the behavior (BA), subjective norms (SN), perceived behavioral control (PBC), and behavioral intention (BI) of ATs. We used a linear multiple regression to determine if the TPB constructs BA, SN, and PBC predicted BI and if PBC and BI predicted behavior according to the TPB model.

Results: We found that BA, SN, and PBC predicted BI ($R = 0.683$, $R^2 = 0.466$, $F_{3,202} = 58.78$, $P < .001$). The BA ($t_{202} = 5.53$, $P < .001$) and PBC ($t_{202} = 9.64$, $P < .001$) contributed to the model, whereas SN ($t_{202} = -0.84$, $P = .402$) did not. The PBC and BI predicted behavior ($R = 0.661$, $R^2 = 0.437$, $F_{2,203} = 78.902$, $P < .001$).

Conclusions: In this sample, the TPB constructs predicted BI and behavior of ATs' compliance with recommended concussion-management guidelines. The BA and PBC were the most influential constructs, indicating that those with positive attitudes toward concussion-management recommendations are more likely to implement them, and ATs are less likely to implement them when they do not believe they have the power to do so. We theorize that interventions targeting ATs' attitudes and control perceptions will lead to improved compliance.

Key Words: concussion management, traumatic brain injuries, practice guidelines

Key Points

- Using the theory of planned behavior constructs to investigate the application of recommended concussion-management guidelines by athletic trainers, we found that attitudes toward the behavior and perceived behavioral control were most influential.
- Interventions that take into account athletic trainers' attitudes and perceived control may help to increase compliance with concussion-management guidelines.

Given estimates of 1.6 to 3.8 million sport-related concussions occurring in the United States each year,[1] sports medicine professionals must be able to evaluate and manage concussions properly. With most athletic injuries, the sports medicine team can clearly define the presence and severity of an injury; however, factors such as an athlete's age[2] and sex[3] and the location and magnitude of an impact[4] can make it difficult to clearly define the severity of a concussion.

To help sports medicine professionals who care for concussed athletes, a number of organizations[5–8] have proposed the use of a multifaceted approach to evaluate and manage sport-related concussions. The guidelines established by these organizations for the evaluation and management of sport-related concussions endorse the use of (1) a clinical examination,[5,7,8] (2) a symptom checklist,[6] (3) postural-control assessment,[6–8] (4) neuropsychological testing,[5–8] (5) baseline testing when available for high–concussion-risk athletes,[6,7] and (6) a return-to-play protocol with a daily increase in activity once an athlete has been deemed symptom free.[5–8] Also, the recommendations emphasize that it is imperative to focus on the athlete's data gathered from the evaluation when making a return-to-play (RTP) decision throughout the concussion-management process rather than relying on a predetermined timeline.[6–8]

The multifaceted approach to evaluating and managing concussions has been recommended since 2002.[5] Sports

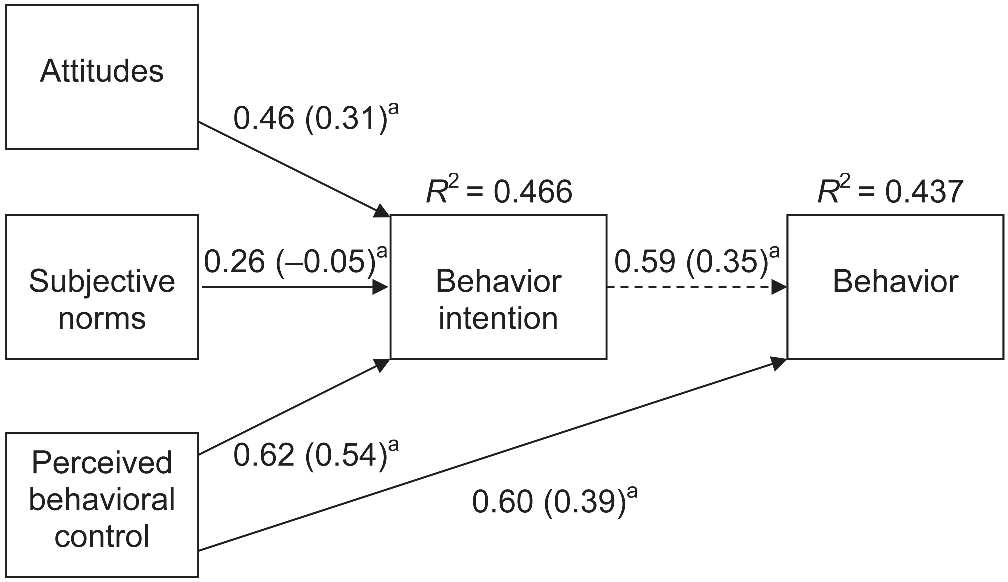

Figure 1. Theory of planned behavior results with Pearson *r* (beta weight) for each construct. [a] Significant at $P < .001$.

medicine professionals have shown a steady but slow increase in compliance with the recommendations over the past decade, yet barriers to incorporation of these standards remain.[9–11] To improve compliance, it is important to understand sports medicine professionals' beliefs about the multifaceted approach to concussion management.[12] If we can understand why a minority of sports medicine professionals use recommended concussion-management guidelines, we can identify strategies to change common practices. The theory of planned behavior (TPB) offers an avenue to investigate these beliefs.

The TPB focuses on theoretical constructs that are concerned with individual motivational factors (behavioral intention [BI]) as determinants of the likelihood of performing a specific behavior.[13–15] The TPB includes measures of attitude, subjective normative perceptions, and perceived behavioral control (PBC) that determine BI, with BI leading to a behavior. The TPB assumes that all other factors, including demographics and the environment, operate through the model constructs and do not independently contribute to explaining the likelihood of performing a behavior.

The TPB has 4 guiding constructs: (1) attitude toward the behavior (BA), or an individual's positive or negative evaluation of self-performance of a behavior and an individual's belief about the consequences of that behavior; (2) subjective norms (SN), or an individual's perception of what other persons think about the individual performing the behavior and the individual's motivation to comply; (3) PBC, or a perception that the individual has control over performing a behavior; and (4) BI, or the individual's intent to perform or not perform the behavior based on the weight of the first 3 constructs (Figure 1). The TPB depicts behavior (B) as a linear regression function: $B = w_1BI + w_2PBC$, where w_1 and w_2 are empirically determined weights.

The following is an example of how the TPB can help us understand the decision-making process of a sports medicine professional in determining whether to use a concussion-management technique. An athletic trainer (AT) believes it is important to implement neuropsychological testing after every concussion (BA). The AT may or may not be influenced by his or her perceptions about how the head coach feels regarding this concussion-management tool (SN). Finally, the AT must decide if he or she has enough authority in the athletic department to acquire the funds to purchase the neuropsychological tests (PBC). According to the TPB, the summation of these 3 constructs results in the AT's intention to perform neuropsychological tests. An AT who intends to perform neuropsychological tests is more likely to do so. However, if the AT feels that he or she lacks full volitional control over the behavior (PBC), the BI may have less influence on behavior.

To understand why a minority of sports medicine professionals are currently applying the concussion-management guidelines, we would like to understand their beliefs and perceptions regarding the guidelines. Therefore, the purpose of our study was to examine the influence of ATs' attitudes and beliefs toward the current recommended concussion-management guidelines through an application of the TPB.

METHODS

Participants

We requested that the National Athletic Trainers' Association (NATA) e-mail a cover letter and link to the online survey instrument to a stratified, randomly generated list of 1000 regular or student certified members. The randomly generated list was stratified to equally represent ATs from all NATA districts and to selectively target ATs working in secondary school/clinic, high school, and college/university settings. Using the August 2010 NATA membership statistics, we identified 13 683 total members in the 4 settings we intended to survey. The participants were instructed via the cover letter that completing the survey instrument implied informed consent. The study was reviewed and approved by the principal investigator's

Table 1. Theory of Planned Behavior Constructs and Survey Distribution

Construct	Definition	Questions, No.	Scale
Attitude toward the behavior	Belief about an individual's self-performance and expected outcomes of the behavior	12	7-point Likert scale from *strongly agree* to *strongly disagree*
Subjective norms	Belief about others' perceptions of the individual performing the behavior and the motivation to comply	15	
Perceived behavior control	Belief about access to necessary resources and opportunity to perform the behavior based on perceived control	9	
Behavior intention	Intention to perform a behavior based on the first 3 constructs	8	
Behavior	Actual compliance with behavior	9	4-point scale from *always* to *never*

university institutional review board before the project began.

Instrument

We developed a 66-item instrument to establish and understand ATs' beliefs and behavior in regard to evaluation and RTP decisions in concussed athletes. The survey consisted of 2 sections: TPB questions ($n = 53$) and demographic and concussion-management questions ($n = 13$). The instrument used 4 position and consensus statements as the basis for all questions.[5–8] Questions were based on diagnosis, management, and decision-making recommendations in the statements.

Instrument Development. To develop the survey instrument, we used a table of specification following the Ajzen considerations for constructing a TPB questionnaire (Table 1).[16] The TPB belief statements were rated on a 7-point Likert type scale, ranging from *strongly agree* to *strongly disagree*. The BA items ($n = 12$) were drafted to understand if ATs believe they should follow specific components of the concussion-management guidelines and if they believe the guidelines will result in positive outcomes for athletes with sport-related concussions. The SN items ($n = 15$) were created to comprehend ATs' beliefs of social expectations (ie, opinions of team physicians, athletes, coaches, parents or guardians, and employers) and their willingness to comply with the perceived expectations of these groups. The PBC items ($n = 9$) were generated to learn ATs' beliefs regarding perceived control (eg, "It is difficult for me to...") and opportunity (eg, "If I wanted to, I could...") to follow the concussion-management guidelines. The BI items ($n = 8$) statements measured ATs' intentions to comply with specified components of the concussion-management guidelines. The behavior items ($n = 9$) asked the ATs how often they followed specific recommendations of the concussion-management guidelines. Behavior was assessed through a 4-point scale ranging from *always* to *never*. Scoring for all statements that were negatively phrased was reversed to ensure proper scaling.

Demographic and concussion-management questions ($n = 13$) were designed to understand ATs' current practice patterns for diagnosing and managing sport-related concussions. The instrument developed by Ferrara et al[10] and used in subsequent studies[9,11] served as the foundation for developing the demographic questions.

Validity and Reliability. Content validity was established by a panel of experts (mean years of experience = 7.5 ± 3.22) in the fields of concussion management ($n = 3$) and TPB ($n = 2$) using an item-content–relevance analysis reported by Dunn et al[17] and developed by Aiken.[18] The item-content–relevance analysis was performed by having the concussion-management experts rate the fit of each item when compared with the 4 concussion position or consensus statements using a 1 to 5 scale (1 = *poor fit*, 5 = *excellent fit*), whereas the TPB experts assessed each question for fit with the intended TPB construct using the same 1 to 5 scale. The criterion for a question to be included in the final instrument was an average of 3 or greater on the item-content–relevance analysis. A score of 3 indicated an *appropriate fit* with the concussion statements and intended TPB construct. Face validity was assessed with a focus group of ATs (mean years of experience = 9.00 ± 8.76) practicing in the high school ($n = 3$) or collegiate setting ($n = 6$). During the focus group, a discussion format was used to try to resolve any problems the ATs perceived with the instrument's format, language, word usage, or question clarity. Modifications to the instrument were then made based on the focus group's comments.

Using data from a pilot survey of ATs ($n = 131$), we performed a confirmatory principal component analysis with varimax rotation using SPSS (version 17.0; SPSS Inc, Chicago, IL) to confirm that each item's explained variance loaded on the correct factor associated with the constructs of the TPB. The Kaiser criterion was used so that eigenvalues of 1.0 or greater set the minimum number of variables in our instrument. We confirmed the correct number of factors with a scree plot. Items that did not correctly explain the variance in the intended TPB construct were modified for a better fit or removed from the instrument. For example, "I believe" was added to 2 attitude items so that the participant would clearly understand that these questions were about his or her beliefs on the subject matter. According to the Ajzen[16] table of specification for developing TPB questions, a time period should be set for PBC items. Therefore, the phrase "from now on" was added to the 4 questions that originally did not specify a time period.

Internal consistency for each scale was assessed using the Cronbach α, with values of 0.744, 0.795, 0.801, and 0.759 for BA, SN, PBC, and BI, respectively. All items in the instrument demonstrated item-total correlations greater than 0.20.[19]

Data Collection

Participants were asked to access the online survey hosted by MRInterviewer (SPSS Inc). A 1-month window was allowed for participants to access and complete the survey. A reminder letter was sent to all participants 2 weeks after the initial e-mail. Participants were allowed to withdraw from the survey at any time and to skip questions without any penalty.

Statistical Analysis

Missing data (<1%) were imputed through multiple imputation with NORM 2.03 (Pennsylvania State University, University Park, PA). We used a linear multiple-regression analysis in SPSS (version 18.0) to determine if the TPB constructs BA, SN, and PBC explained the variance in BI and if PBC and BI explained the variance in behavior. The test statistic (*t*) in the linear multiple-regression analysis was calculated to describe the significance of the constructs in the TPB model.

Descriptive statistics and frequencies were computed to understand the practice patterns of ATs with regard to baseline testing, diagnosing concussions, and making RTP decisions after concussion.

We also present the frequencies of ATs who concurrently used the tests recommended in the concussion-management guidelines created by the NATA and International Conference on Concussion in Sport when diagnosing a concussion and making an RTP decision. We recoded the frequency data to show the number of ATs who concurrently used 5 tests to diagnose a concussion: (1) clinical examination, (2) symptom checklist, (3) postural-control assessment, (4) sideline neurocognitive testing, and (5) neuropsychological testing. For RTP decisions, we recoded the data to present the number of ATs who concurrently used 6 tests: (1) clinical examination, (2) symptom checklist, (3) postural-control examination, (4) sideline neurocognitive testing, (5) neuropsychological testing, and (6) incremental RTP protocol. To determine if a clinician was performing a postural-control examination, the Balance Error Scoring System (BESS) and force-plate postural-stability variables were combined. The sideline neurocognitive testing variable was a combination of the Standardized Assessment of Concussion and the Sport Concussion Assessment Tool (SCAT) 2 scores, whereas the neuropsychological testing combined the neuropsychological computerized and paper-and-pencil testing variables.

RESULTS

A total of 221 of 1000 participants (22.1%) responded to the survey. In addition, 17 respondents did not complete a majority of the survey, and their results were not included in the analysis. The mean years of experience for the participants were 10.8 ± 8.3 (Figure 2). Most worked in the secondary school/clinic setting (104 of 204 [51.0%]), followed by high school (84 of 204 [41.2%]), other (9 of 204 [4.4%]), and college/university (7 of 204 [3.4%]. The most frequent current position was head AT (121 of 205 [59.0%]), followed by other (31 of 205 [15.1%]), clinic/outreach AT (20 of 205 [9.8%]), assistant AT (16 of 205 [7.8%]), faculty/staff AT (15 of 205 [7.3%]), and graduate assistant AT (2 of 205 [1.0%]). Respondents in the *other* category were most often working as physician extenders in sports medicine clinics. The participants indicated assessing 2.6 ± 2.1 concussions on average per month (Figure 3).

Theory of Planned Behavior

The combination of BA, SN, and PBC explained 47% of the variance in BI regarding current concussion-management guidelines ($R = 0.68$, $R^2 = 0.47$, $F_{3,202} = 58.78$, $P < .001$). The BA ($t_{202} = 5.53$, $P < .001$) and PBC ($t_{202} = 9.64$, $P < .001$) constructs contributed to the model, whereas SN did not ($t_{202} = -0.84$, $P = .402$). The PBC and BI constructs explained 44% of the variance in ATs' behavior regarding current concussion-management guidelines ($R = 0.66$, $R^2 = 0.44$, $F_{2,203} = 78.90$, $P < .001$; Figure 1).

Concussion-Management Practice Patterns

A majority (151 of 199 [75.9%]) of the participants have a protocol with their team physician for managing sport-related concussions. The frequencies of use for specific concussion-management tools during baseline testing, diagnosis of a concussion, and making RTP decisions are shown in Tables 2 through 4, respectively. The reported frequencies in previous studies[9,10] that used the same concussion-management questions are provided in Tables 3 and 4, with the exception of 1 study[11] that did not report numeric values for tallies and frequencies.

On average, ATs used 3.2 ± 1.4 of the 5 recommended tests to diagnose concussions and 4.0 ± 1.2 of the 6 recommended tests to make RTP decisions after concussions. Fewer than 3 of the recommended tests to diagnose a concussion and make an RTP decision were used by only 22.4% and 10.5%, respectively, of ATs. Use frequencies by ATs of the number of recommended tests are given in Table 5.

DISCUSSION

Overall awareness of concussion diagnosis and proper management has increased in sports medicine professionals since the late 1990s. Three studies[9–11] from 2001 to 2009 demonstrated a gradual increase in the implementation of concussion-management tools, which are associated with a multifaceted approach, by ATs. Our results indicate increasing use of concussion-management tools by ATs (Tables 2 through 4). Compared with the latest study,[9] for diagnosis and RTP decision making, use of computerized neuropsychological testing and the BESS increased 10.1% and 12.9% and 9.2% and 12.0%, respectively.

Also encouraging is that a majority of ATs used a multifaceted approach to diagnose and make RTP decisions after concussion. However, only a small percentage used all the recommended tools.

Although use of computerized neuropsychological testing and the BESS increased, some of the most objective recommended tools are used by only a minority of ATs to diagnose and make RTP decisions after sport-related concussion. To increase compliance with the recommended concussion-management guidelines, targeted interventions may be warranted. When identifying appropriate interventions, it is imperative to first understand the beliefs underlying a given behavior.[12,20,21]

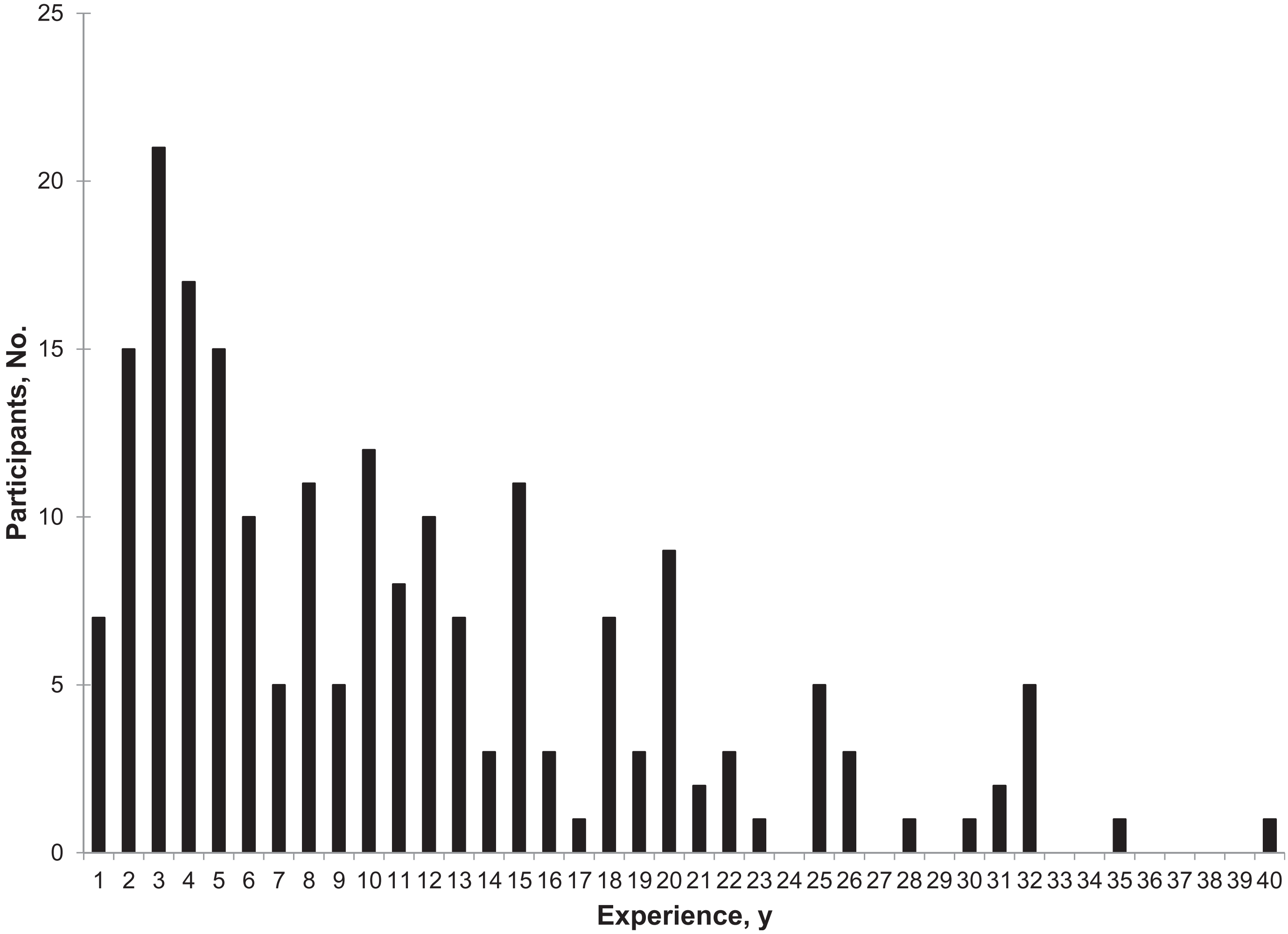

Figure 2. Participants' years of experience.

Strong evidence indicates that intervention programs aimed at the correct antecedents (BA, SN, and PBC) of behavior can change specified behaviors.[22–24] This study is the first step in identifying beliefs and some potential solutions that may improve compliance among ATs. The effectiveness of these interventions in changing ATs' compliance with concussion-management recommendations must be assessed. In particular, we focus this section on providing recommendations for interventions that influence BA and PBC because they contributed significantly to explaining BI.

When a behavior is under a person's complete volitional control, BA is generally the best predictor of BI.[25] However, in our sample, PBC was the greatest predictor of whether an AT followed the recommended concussion-management guidelines. This indicates that ATs feel they lack complete authority to implement the recommended guidelines; interventions focused on giving ATs more control may have the largest effect in increasing compliance.

The PBC beliefs can be divided into 2 categories: ability-related control beliefs and resource-related control beliefs.[26] More research will need to be conducted in this area to understand how these categories influence concussion-management behaviors, particularly because the potential interventions devised to affect compliance will differ significantly.

Ability-related control beliefs include feeling tired or burned out and not having enough energy to perform the action. When compared with other service professions, the nature of athletic training leads to an increased number of factors associated with burnout, such as emotional exhaustion, lack of personal accomplishment, and depersonalization.[27,28] An AT's ability to cope with stress and the presence of a good social-support network can lead to increased work production and a desire to complete more tasks at work.[27] Balancing workplace and life demands may enhance an AT's ability to incorporate tools and protocols such as the concussion-management guidelines into clinical experiences. If the ATs' low rate of compliance with concussion-management guidelines stems from ability-related control beliefs, then possible solutions may focus on the demands of the profession, flexibility of work schedules, and staffing patterns.[29]

Resource control beliefs include not having support from a coach, administrator, or parent; lack of sufficient funds to purchase equipment, such as computerized neuropsychological testing; and a shortage of time due to other duties and responsibilities. For ATs, resource control beliefs are often associated with their perceptions of how others, such as coaches and administrators, will act to provide

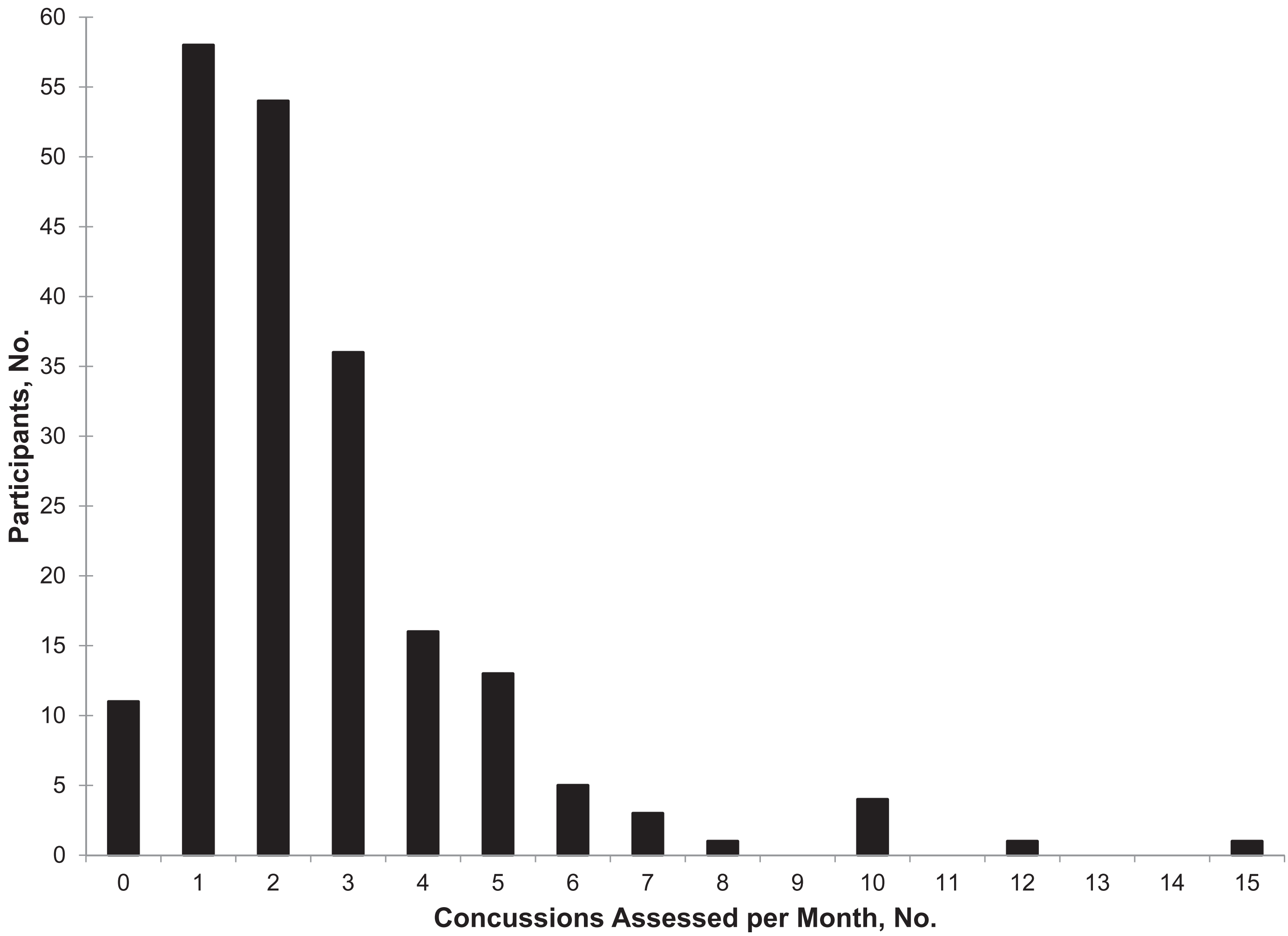

Figure 3. Number of concussions, on average, participants reported assessing each month.

appropriate resources. When asked to recognize the signs and symptoms associated with concussions, coaches have a significantly better knowledge base than the general public,[30,31] but no published study to date has reported coaches' knowledge and perceptions regarding concussion-management guidelines and tools. In many cases, coaches become athletic administrators with control over ATs' resources and ability to purchase specific concussion-management tools or implement concussion-management practices. In particular, ATs and the NATA may need to find ways to quantify the financial and academic effects of properly versus improperly managed concussions. A strong financial argument may help ATs persuade administrators to provide more resources (both physical and human), including concussion-management tools.

Another way for ATs to develop more perceived control for implementing medical guidelines, such as the concussion-management guidelines, is to surround themselves with a better support group that includes their team physicians and other qualified health care providers. This support group, which is more informed about health care practices than are coaches and athletic directors, can serve as an advocate for the AT when implementing health guidelines, such as the concussion-management guidelines.[32] This greater support from allied health care professionals may enhance the AT's beliefs regarding PBC and in turn lead to greater compliance with the guidelines. For example, 75.9% of participants and their team physicians had a protocol for managing sport-related concussions. If ATs ask their team physician and school nurse to help present the concussion-management protocol to athletic directors, coaches, parents, and athletes, they will demonstrate a united effort in caring for patients and help create a system of accountability in managing concussions.

The BA construct contributed significantly in predicting whether ATs followed the recommended concussion-

Table 2. Tools Used by Athletic Trainers as Baseline Measurements

Tool	Frequency (%) (n = 202)
Balance Error Scoring System	34 (16.8)
Force-plate postural stability	0 (0.0)
Standardized Assessment of Concussion	41 (20.3)
Neuropsychological testing (computer)	90 (44.6)
Neuropsychological testing (paper and pencil)	12 (5.9)
Graded symptom checklist	48 (23.8)
SCAT2	27 (13.4)
None	49 (24.3)
Other	10 (5.0)

Abbreviation: SCAT2, Sport Concussion Assessment Tool 2.

Table 3. Tools Used by Athletic Trainers to Diagnose Concussion, Frequency (%)

Tool	This Study (n = 205)	Covassin et al[9] (n = 513)	Ferrara et al[10] (n = 338)	Ferrara et al[10] (n = 338)[a]
Clinical examination	183 (89.3)	464 (91.0)	238 (33.0)	238 (70.4)
Head computed tomography or brain magnetic resonance imaging	29 (14.1)			
Graded symptom checklists	157 (76.6)	399 (78.2)	255 (35.7)	255 (75.4)
Balance Error Scoring System	77 (37.6)	145 (28.4)	36 (5.0)	36 (10.7)
Force-plate postural stability	2 (1.0)			
Standardized Assessment of Concussion	112 (54.6)	277 (54.3)	76 (10.6)	76 (22.5)
Neuropsychological testing (computer)	89 (43.4)	170 (33.3)	106 (15.3)	106 (32.2)
Neuropsychological testing (paper and pencil)	16 (7.8)	48 (9.4)		
SCAT2	80 (30.0)			
Other	7 (3.4)	33 (6.5)		

Abbreviation: SCAT2, Sport Concussion Assessment Tool 2.

[a] Frequencies and percentages were recalculated based on the number of participants who reported using that tool and the total sample size reported by Ferrara et al.[10]

management guidelines. The most successful intervention for increasing attitudes toward a specific behavior is to present information that will change an individual's perspective of that behavior.[25] In particular, ATs need information that encourages them to believe that using a multifaceted concussion-management protocol will result in positive outcomes and is worth the time, effort, and possible resistance from athletes and coaches.

When presenting information to change an individual's perspective of that behavior, interventions that require some form of activity by the recipient are more successful than passive interventions, which rely on presentations of material.[25] This finding has potential implications for creating educational interventions such as continuing education activities at conferences and symposiums.

The SN construct in the TPB is defined as an individual's perception about how peers would have him or her act with regard to a behavior and, in general, how motivated the individual is to comply with peers.[13] In our sample, the normative influences of team physicians, coaches, parents, athletes, and peer ATs did not have significant roles in understanding ATs' BI and consequent behavior in implementing the concussion-management guidelines. This result is similar to findings from a meta-analysis that SN was the weakest predictor of BI.[22] Knowledge of this factor may be advantageous when investigating interventions to enhance compliance with recommended concussion-management guidelines, because interventions can focus on changing ATs' attitudes toward concussion management rather than how they perceive the ideology of their peers (ie, coaches, administrators, parents or guardians, and team physicians).

The TPB has limitations in its generalizability of information. As noted, TPB-guided interventions can help us understand the antecedents to concussion-management behavior. This study is the first step in understanding a population's beliefs and providing information about which areas should be the focus of interventions. We have outlined areas of interest, but future researchers must identify specific interventions that best enhance ATs' compliance with the concussion-management recommendations based on their population characteristics.

The inherent limitations of survey research are associated with our study. We had a lower-than-desired response rate of 22.1%, which may reflect the time of year we distributed the instrument. We collected our sample in the late fall, when many ATs are transitioning from fall to winter sports. Of those who responded, only 3.4% worked in the college/university setting, whereas 92.2% of the respondents worked in the secondary school/clinic or high school setting. This low response rate in the college/university setting allows us to generalize our results only to the other surveyed settings, high school and clinic/outreach. Because we sought to study ATs who work closely with contact-

Table 4. Tools Used by Athletic Trainers to Make Return-to-Play Decisions, Frequency (%)

Tool	This Study (n = 203)	Covassin et al[9] (n = 513)	Ferrara et al[10] (n = 312)
Clinical examination	183 (90.1)	472 (92.7)	75 (24.0)
Physician recommendations	161 (79.3)	454 (89.7)	89 (28.5)
Head computed tomography or brain magnetic resonance imaging	24 (11.8)	84 (16.5)	
Graded symptom checklists	138 (68.0)	368 (72.3)	50 (16.0)
Balance Error Scoring System	71 (35.0)	117 (23.0)	
Force-plate postural stability	1 (0.5)		
Standardized Assessment of Concussion	82 (40.4)	224 (44.0)	11 (3.5)
Neuropsychological testing (computer)	94 (46.3)	170 (33.4)	6 (1.9)
Neuropsychological testing (paper and pencil)	11 (5.4)	38 (7.5)	
SCAT2	66 (32.5)		
Concussion grading scales	41 (20.2)	208 (40.9)	
Return-to-play guidelines	169 (83.3)	373 (73.3)	58 (18.6)
Player self-report	110 (54.2)	223 (43.8)	8 (2.6)

Abbreviation: SCAT2, Sport Concussion Assessment Tool 2.

Table 5. Number of Recommended Concussion Tests That Athletic Trainers Used Concurrently

Tool Used Concurrently	Frequency (%)	
	Diagnosis	Return to Play
0	3 (1.5)	2 (1.0)
1	14 (6.8)	5 (2.5)
2	29 (14.1)	14 (7.0)
3	67 (32.7)	39 (19.6)
4	67 (32.7)	70 (35.2)
5	25 (12.2)	50 (25.1)
6[a]	NA	19 (9.5)

Abbreviation: NA, not applicable.

[a] "Diagnosis" contained only 5 groups.

sport athletes, our results are not comprehensive to all ATs. Those who work in other settings in which concussions occur, such as professional sports and the military, may have different beliefs and practice patterns toward the current recommended guidelines.

We were also limited by ATs' general lack of familiarity with TPB questions. Azjen[16] suggested specific wording when developing TPB items so that they match the intended construct.[16] An assumption associated with survey research is that each participant interprets the questions in the same way. Given this lack of familiarity, more variability than expected in the participants' ability to correctly answer the TPB questions could be present.

CONCLUSIONS

Improved attitudes toward implementation of recommended concussion-management guidelines and greater perceived control could increase the number of ATs using a multifaceted concussion-assessment and -management protocol. Using the TPB as our guide, we outlined areas where interventions may increase the compliance of ATs in following the recommended concussion-management guidelines; however, future research is required to determine the effectiveness of specific interventions to increase compliance based on ATs' population characteristics.

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