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Matthew Kutz & Sara Stiltner

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Integration of contextual intelligence by sport medicine clinicians in the United States

Matthew Kutz [a] and Sara Stiltner[b]

[a]Department of Athletic Training, Nicole Wertheim College of Nursing and Health Sciences, Florida International University, Miami, FL, USA; [b]Department of Kinesiology, Texas A&M – Corpus Christi, Corpus Christi, TX, USA

ABSTRACT

Context: Contextual intelligence (CI) has been theorized to be an asset to the clinical practice of Athletic Trainers (AT's). However, no research has explored if CI behaviors are practiced by AT's.

Objective: To delineate the practice frequency of CI by athletic trainers and describe any differences according to respondent characteristics.

Participants: 2143 clinical AT's were invited to participate. 284 completed the survey (13.2%) and 229 were usable (81%). Forty-four percent (44%) of participants earned a professional Master's degree; the most frequently reported age range was 26–30 years old (29%); and a the majority (59%) of participants had ≥10 years of experience and (82%) were Caucasian/White.

Main outcome measure(s): Frequency of CI behaviors were measured using the Contextual Intelligence Profile™ (CIP™).

Results: The Cronbach coefficient alpha for the 48-item CIP™ was α = .935. . Kaiser–Myers–Olkin's (KMO) Measure of Sampling Adequacy for the means of the CIP's™ 12-behaviors was 0.927; and Bartlett's Test of Sphericity was significant ($X^2 = 1195.04_{(66)}$, $p = .001$), indicating validity. All 12 CI behaviors were practiced by participants. However, no CI behavior was practiced with high frequency (M≤1.50). No differences were found according to sex or district. ANOVA with a Games-Howell post hoc analysis indicated differences between several respondent groups including ethnicity, education level, experience level, and dual credentialed. Paired samples t-tests found that *Foresight* (M = 1.82 ± .66) and *Hindsight* (M = 1.80 ± .61) behaviors were practiced more frequently than *Insight* behaviors (M = 2.19 ± .86); (tF = 8.486(172), $p = .001$; tH = 8.303(171), $p = .001$, respectively).

Conclusions: All (12) CI behaviors were reported to be practiced by AT's. However, none of them were practiced with high frequency. *Insight* behaviors were practiced the least. More experienced and educated athletic trainers reported practicing CI behaviors more often.

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Leadership; complexity; VUCA; athletic training; athletic trainer; athletic therapy

Introduction

The healthcare industry is famously complex [1]. In fact, healthcare is recognized as one of the most complex environments to navigate [1,2]. VUCA (volatility, uncertainty, complexity, and ambiguity) is ubiquitous throughout healthcare and is a reality that all healthcare professionals, regardless of discipline, need to embrace [3]. Consequently, healthcare educators and medical preceptors must work to teach strategic thinking and leadership processes robust enough to navigate the turbulence caused by the uncertainty and ambiguity associated with a VUCA world.

Athletic Training (AT) is a specialized clinical profession working directly in treating physically active patients with their healthcare needs (e.g. orthopedic, musculoskeletal, injury prevention and care, etc.). Within the United States Athletic Trainers' credentials are regulated nationally, and by each state. To practice as an AT in the United States, individuals must be credentialed by the Board of Certification, Inc. (BOC) as a Certified Athletic Trainer (ATC®) and also licensed to practice Athletic Training in their respective state. As a closely regulated healthcare profession, Athletic Trainers must undergo rigorous credentialing and continuing education processes. Maintaining the credential, and thus continuing education, is regulated by the BOC. Entry-level professional education, which requires a professional masters degree, is regulated by the CAATE (Commission on Accreditation of Athletic Training Education) in collaboration with the CHEA (Council for Higher Education Accreditation). Recently the CAATE has accredited universities in Spain and other countries are now exploring this option. Recognizing the global need of this aspect of healthcare, the BOC has initiated an *International Arrangement*, which is a collaboration for global mobility between clinicians within the Athletic Rehabilitation Therapy Ireland (ARTI),

CONTACT Matthew Kutz mkutz@fiu.edu Department of Athletic Training, Nicole Wertheim College of Nursing and Health Sciences, Florida International University, 11200 SW 8th Street, AHC3, Miami, FL 33199, USA

BOC (USA), Canadian Athletic Therapists Association (CATA), and the British Association of Sport Rehabilitators (BASRaT).

Given the emerging global mobility of this unique clinical discipline and the complexity associated with international collaboration between different regulatory agencies around the globe it is critical that new skills, many of which are non-clinical in nature, be identified and propagated. Due to VUCA athletic trainers and therapists should be educated to be able to respond to sudden shifts in the environment and among stakeholders. Higher education in general, [4] and medical [5] and nursing [6,17] education specifically, have made efforts to respond to VUCA by introducing curriculum and assessments to accommodate this emerging reality. For example, nurse educators, Miles and Scott [17] proposed a new theoretical model (the Nursing Leadership Development Model) for the American Association of Colleges of Nursing, which identified *contextual intelligence* as a necessary part of a new framework for educating nurse leaders. Despite the growing global landscape, no similar recommendations or models have been recommended for athletic training education in the United States. Preparation to potentially practice in a more globally mobile profession adds a significant level of complexity and volatility to an already VUCA context is paramount.

Athletic training and therapy educators need to be able to prepare clinicians to handle the high level of volatility, uncertainty, complexity, and ambiguity inherent in their roles and the larger healthcare context. For example, the Board of Certification, states that entry-level athletic trainers must have skills in 'providing leadership appropriate to situations and people.' ([31], 61)

Table 1. Rules and assumptions that govern a VUCA context.

Traditional rules & assumption	VUCA rules and assumptions
Experience is developed by time served and is an asset	Experience biases us from seeing new things and can be a liability
Work-life balance is key to professional joy	Seeking work-life balance moves one further away from work-life integration
Loyalty is measured by time served	Loyalty is measured by intensity of effort
Leaders are problem solvers who answer questions	Leaders are the ones who ask the best questions
The complicated needs to be simplified	Nothing is complicated, everything is complex.
Insight is the goal: Deductive (reductive) reasoning provides better insight	Foresight is the goal: Inductive (emergent) reasoning provides better foresight
Corporate vison and core values are explicit and come in quantifiable lists after strategic planning	Vision and values are tacit and often the unconscious drivers of behavior
Efficiency is the driving metric success	Meaning is the driving metric of success
People can be passive observers without interfering with outcomes	Observation always alters the outcomes of what is being observed
Chaos is to be avoided and managed	Chaos is to be leveraged as an opportunity
Systems are inherently unorganized and require external intervention	Systems inherently will self-organize and requires no intervention

aTable adapted from Kutz [26].

One way to do this is to learn to practice contextual intelligence. Unique to the VUCA environment are constantly changing 'leadership rules,' and addressing those changes without contextual intelligence and other meta-skills (i.e. higher-order skills that are applicable across disciplines that lead to building new skills [7]) could thwart professional development. Table 1 is a list of some of those changing rules and assumptions within a VUCA context.

Contextual intelligence (CI) has been described as a necessary and viable leadership-related skill set within athletic training, [8,9] medicine, [10,11] military science, [12] educational psychology, [13] institutional research, [14] higher education, [15] human resources, [16] nursing, [17] international business, [18,19] and sports psychology.[20] CI is reported to help in 'identifying external and internal influences that are not immediately obvious, helps in considering nonlinear relationships, promotes a holistic perspective to resolve tensions among opposite ideas, and generates innovative outcomes, [21] in general, CI can be particularly useful in VUCA environments.

Research in athletic training and healthcare administration has also described the necessity of contextual intelligence [8,21]. Contextual Intelligence was introduced in the scholarly literature in the 1980s [18], but Kutz [21] was the first to identify specific behaviors associated with CI. The contextual intelligence framework is a circumplex based on 12 behaviors organized around three (3) time-orientations (i.e. Hindsight, Insight, and Foresight), called 3D thinking, [21] which in turn are grouped according to three (3) meta-skills (Complexity Thinking, Synchronicity, and Tacit Awareness). (Figure 1 and Table 2).

It is incumbent upon educators of athletic trainers and therapists to begin to place a higher priority on non-clinical skills with clinical significance. Contextual intelligence may be one such skill. Despite its reported importance, [8,21,22] no research has explored if contextual intelligence is practiced by athletic trainers. Therefore, the aims of this investigation are twofold, (1) to generate dialogue and future research initiatives around contextual intelligence within healthcare in general and athletic healthcare specifically and (2) describe any existing contextual intelligence behaviors of athletic trainers practicing in the United States. Those aims have led to the following research questions:

1. What are the contextual intelligence behaviors of athletic trainers practicing in the United States?
2. Are there differences according to respondent characteristics of the contextual intelligence behaviors demonstrated by athletic trainers?

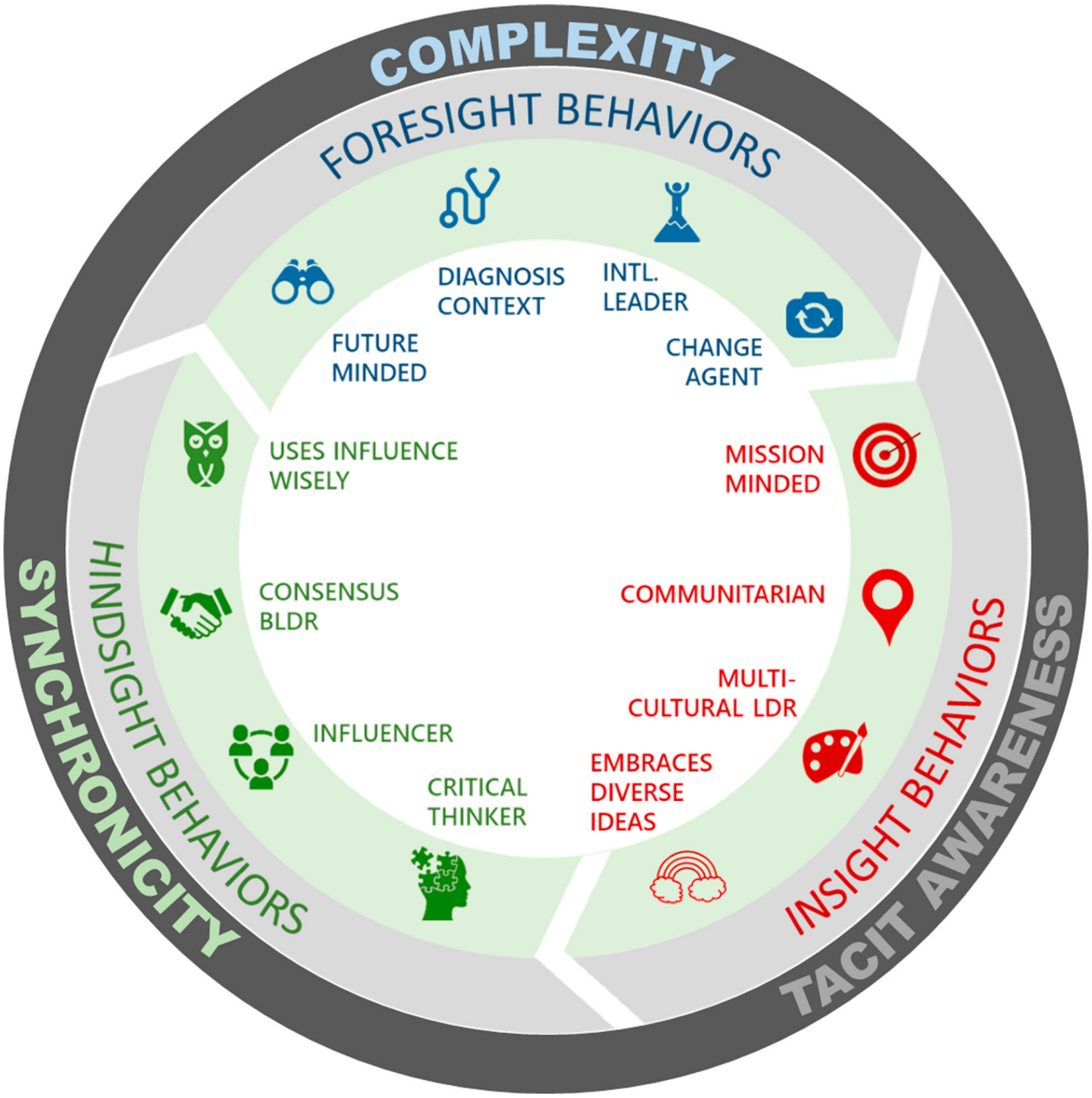

Figure 1. Contextual Intelligence Circumplex™ 3.0.

The ramifications of these findings on athletic training education and the clinical practice of athletic trainers and therapists could be profound.

Methods

A nonexperimental descriptive survey of athletic trainer's behaviors relative to contextual intelligence was conducted. Because of our unique interest in how athletic trainers' function within a complex system, a purposive homogenous sampling strategy was used [23]. The Institutional Review Board from the primary investigators institution approved the methods and the use of this survey for human subjects.

Statistical analysis

Statistical analysis was conducted using SPSS 26.0 (SPSS Inc., Chicago Illinois). Differences in respondent groups were evaluated using independent samples *t*-tests and one-way analysis of variance (ANOVA) followed by Games-Howell post hoc comparisons. The Cronbach coefficient α with Item Analysis was used to test the internal consistency-reliability of the Contextual Intelligence Profile™ (CIP™). The Pearson *r* correlation coefficient was calculated to determine associations (effect size) between scale items. Paired samples t-tests were used to compare aggregate means of the 3D thinking factors. When necessary, measures of central tendency (means) were also reported where appropriate.

Table 2. CI behaviors.

CI behavior	3D-Thinking dimension	Brief description
1. Diagnosis context	Foresight	Knows how to appropriately interpret and react to shifts or changes in one's surrounding.
2. Change agent	Foresight	Raises difficult and challenging questions that others may perceive as a threat to the status quo.
3. Future minded	Foresight	Has a forward-looking mentality and sense of direction and concern for where to be in the future. Sees beyond present contradictions.
4. Intentional leadership	Foresight	Is aware and proactive concerning their own strengths and weaknesses and has delineated goals for achieving personal best and influencing others.
5. Constructive use of influence	Hindsight	Uses appropriate types of power to create a desired image and influence.
6. Critical thinker	Hindsight	Makes connections, integrates, and makes practical application of different actions, opinions, outcomes, and information.
7. Influencer	Hindsight	Uses interpersonal skills to non-coercively affect the actions and decisions of others.
8. Consensus builder	Hindsight	Convinces other people to see the common good or different point of view.
9. Communitarian	Insight	Expresses concern about local social trends and issues and participates in civic and community activities.
10. Mission minded	Insight	Communicates how performance affects the mission. Is aware of how their own attitude affects people's perception of who they represent.
11. Appreciates diverse ideas	Insight	Works to provide opportunities for individuals with different ideas or experiences to interact in a nondiscriminatory manner regardless of minority/diversity status.
12. Multicultural leader	Insight	Non-coercively influences the behaviors and attitudes of ethnically diverse people or groups.

[a]Adapted from Kutz, Ball, Carroll [21].

Table 3. Demographic characteristics of respondents ($N = 229$).

Characteristic	*N* (%)
*Sex (*N = 245)*	
Female	143 (58%)
Male	95 (39%)
Undisclosed	7 (3%)
Ethnicity	
White/Caucasian	189 (82%)
Hispanic or Latino	22 (10%)
Asian-American	11 (5%)
Black or African-American	4 (~2%)
American Indian or native Alaskan	2 (~1%)
Undisclosed	1 (~0.5%)
Age ranges	
22-25	40 (18%)
26–30	67 (29%)
31–35	44 (19%)
36–40	18 (8)
41–45	13 (6%)
46–50	20 (9%)
51–55	12 (5%)
56–60	8 (4%)
61–65	5 (~2%)
66+	2 (~1%)
Highest level of education	
Professional baccalaureate	26 (11%)
Professional Masters	100 (44%)
Post professional Masters	64 (28%)
Clinical doctorate	11 (5%)
Academic/research doctorate	27 (12%)
Undisclosed	1 (~0.5%)
Type of experience	
Young professional (≤10 yrs)	134 (59%)
Midcareer (11-15 yrs)	28 (12%)
Experienced (≥16 yrs)	66 (29%)
Undisclosed	1 (~0.5%)
Representative NATA District	
District 1	18 (8%)
District 2	24 (11%)
District 3	30 (13%)
District 4	51 (23%)
District 5	16 (7%)
District 6	12 (5%)
District 7	13 (6%)
District 8	11 (5%)
District 9	39 (17%)
District 10	12 (5%)
Undisclosed	3 (~1%)
Number of credentials	
ATC® credential only	202 (88%)
Dual credentialed (e.g. PT, CSCS, EMT, etc.)	27 (12%)

Instrumentation

The Contextual Intelligence Profile™ (CIP™) was used for this investigation. Content validity is established since the scale's behaviors and factors are described in the existing literature [21]. The CIP™ assesses the 12 CI behaviors (four questions per behavior, 48-items). The CIP™ was adapted to include demographic information (e.g. sex, ethnicity, age, experience, district, etc.) and included 48-questions of self-reported agreement/frequency of practice using a reverse 7-point Likert scale, ranging from 0 to 6 (0 = strongly agree (I do this always) to 6 = strongly disagree (I do not do this)). Frequency ranges were determined *a priori* to be high frequency = M≤1.50, some frequency = M = 1.51–2.0, irregular frequency = M = 2.1-4.0, and low-frequency = M≥4.1.

Internal-consistency reliability of the CIP™ was evaluated using Cronbach coefficient alphas with item analysis. Convergent validity was evaluated by using Pearson *r* correlations between the 48-item question and aggregate scores for each of the 12 behaviors. Criterion-related concurrent validity is demonstrated by any differences between respondent groups. To confirm previously reported construct validity of the CIP™ Kaiser–Myers–Olkin's (KMO) Measure of Sampling Adequacy with Bartlett's Test of Sphericity was conducted to determine if the 12 behaviors are factorable (indicating a probability of construct validity).

Results

Participants

2143 survey invitations were emailed to potential participants identified from their public domain websites. 284 were returned for a response rate of 13.2%. Of the 284 surveys returned a total of 229 were usable (81%). A majority of the participants were female (59%) and all ten Districts from the National Athletic Trainers' Association (NATA) were represented, with the highest percentage (23%) coming from District 4. Forty-four percent (44%) of participant's highest degree earned was a professional Master's degree; the most frequently reported ages ranged from 26–30 years old (29%); and a the majority (59%) of participants had 10 or less years of experience. Most participants (82%) were Caucasian/White. Overall, the demographic characteristics of these participants were similar to the larger population and is believed to adequately represent the athletic training population. Table 3 describes the participant's demographic characteristics.

Instrument psychometrics

The Cronbach coefficient alpha for the 48-item CIP™ was α = .935 with an item analysis ranging from α = .933 to .937; the Cronbach coefficient alpha for the aggregate means of the 12-behaviors was α = .92 with an item analysis ranging from α = .90 to .92, indicating strong internal consistency-reliability. Pearson r correlation coefficients for all 48 items ranged from r = .193 to .781, p = 001; for the aggregate 12 behaviors r = .22 to .77, p = .001, indicating convergent validity. Kaiser–Myers–Olkin's (KMO) Measure of Sampling Adequacy for the aggregate means of the 12-behaviors was 0.927 and Bartlett's Test of Sphericity was significant ($X^2 = 1195.04_{(66)}$, p = .001) confirming that the 12 behaviors show common variance, suggesting factorability and construct validity. Based on the results of this investigation the CIP™ used on this population of the AT profession is believed to be valid and reliable with similar psychometrics to those reported in other research [21].

Frequency of CI behaviors

All 12 CI behaviors were reported to be practiced; no behavior was practiced with high frequency ($M \leq 1.5$). Nine (75%) of the CI behaviors were practice with some frequency (M = 1.51–2.0) and three (3) were practiced with irregular frequency (M = 2.1-4.0). No CI behavior was practiced with low-frequency or never ($M \geq 4.1$). *Intentional leadership* ($M = 1.57 \pm 0.81$) was the most practiced CI behavior. *Communitarian* ($M = 2.77 \pm 1.30$) was the least practiced CI behavior.

Since no behaviors were reported to be practiced with high-frequency ($M \leq 1.5$) a one sample t-test was conducted to determine if practice frequency was different from *a priori* test value of $M \leq 1.5$. There was a difference for 10 (83%) of the CI behaviors ($t = 3.150_{(172)}$ to $12.887_{(172)}$, $p \leq .002$). Only *Intentional leadership* and *critical thinker* were not significantly lower than 1.50 test. See Table 4 for a ranked list of CI behaviors.

Differences between CI behaviors

Criterion-related concurrent validity of the CIP™ is demonstrated by differences between respondent groups. There were no differences between NATA Districts or sex.

One-way ANOVA indicated differences between ethnicities for two (17%) CI behaviors, *Mission Minded* ($F = 3.086_{(3, 168)}$, p = .029) and *Critical Thinking* ($F = 3.735_{(3, 168)}$, p = .012). Games-Howell post hoc analysis indicated that Asian respondents reported practicing *Mission Minded* less frequently than White/Caucasian, ($M = 3.05 \pm 1.03$ to $M = 2.13 \pm 0.89$, p = .026); and Asian respondents reported practicing *Critical Thinking* less frequently than Black or African-American respondents, ($M = 0.63 \pm 0.66$ to $M = 2.14 \pm 0.77$, p = .006).

One-way ANOVA indicated differences between education level for seven (58%) CI behaviors. *Communitarian* ($F = 2.509_{(4,168)}$, p = .044), *diagnosis context* ($F = 2.433_{(4, 168)}$, p = .049), *mission minded* ($F = 5.022_{(4, 168)}$, p = .001), *influencer* ($F = 3.355_{(4, 168)}$, p = .011), *change agent* ($F = 5.568_{(4, 168)}$, p = .001), *intentional leadership* ($F = 2.432_{(4, 168)}$, p = .049), *and constructive use of influence* ($F = 4.579_{(4, 168)}$, p = .002). Games-Howell post hoc comparison indicated that only four (33%) CI behaviors were different according to education level. 'Four-year degree' holders reported practicing contextual intelligence behaviors less than the other education levels. See Table 5 for the post-hoc analysis of these differences.

One-way ANOVA indicated differences between experience levels (Young professional, midcareer, experienced) for five (42%) CI behaviors. *Diagnosis context* ($F = 5.464_{(2, 169)}$, p = .005), *mission minded* ($F = 9.802_{(2, 169)}$, p = .001), *influencer* ($F = 5.776_{(2, 169)}$, p = .004), *change agent* ($F = 5.820_{(2, 169)}$, p = .004), *and constructive use of influence* ($F = 4.395_{(4, 169)}$, p = .014). Games-Howell post hoc comparison indicated that all 5 CI behaviors were different between experience levels. Young Professionals reported practicing contextual intelligence behaviors less than more experienced respondents. See Table 6 for the post-hoc analysis of these differences.

Table 4. Ranking of CI behaviors (most frequent to least frequent).

			Practice frequency (range 0-6)*			
CI behavior (3D Factor)	Mean	SD	High frequency $M \leq 1.50$	Some frequency $M = 1.51–2.0$	Irregular frequency $M = 2.1–4.0$	low-frequency $M \geq 4.1$
Intentional leadership (F)	1.57	0.81		X		
Critical thinker (H)	1.58	0.78		X		
Diagnosis context (F)	1.69**	0.81		X		
Consensus builder (H)	1.73**	0.74		X		
Influencer (H)	1.82**	0.73		X		
Future minded (F)	1.84**	0.75		X		
Appreciates diverse ideas (I)	1.85**	0.97		X		
Multicultural leadership (I)	1.93**	0.84		X		
Constructive use of influence (H)	2.09**	0.86		X		
Change agent (F)	2.18**	0.91			X	
Mission minded (I)	2.20**	0.97			X	
Communitarian (I)	2.77**	1.30			X	

Independent samples *t*-tests revealed differences between respondents who are dual credentialed compared to respondents who were solely ATC® credentialed. Dual credentialed participants reported practicing four (33%) CI behaviors more frequently. *Consensus builder, mission minded, influencer,* and *constructive use of influence* were all reported to be practiced more frequently by dual credentialed participants ($t = -2.065_{(171)}$ to $-3.430_{(171)}$, $p = .042$ to $.001$). Table 7 delineates differences found between the two respondent groups.

Differences between 3D thinking factors

A paired sample *t*-test was performed to determine if there were any differences between aggregated means of CI behaviors for each of the 3D thinking areas (Hindsight, Insight, and Foresight). Paired samples *t*-tests found that *Foresight* ($M = 1.82 \pm .66$) and *Hindsight* ($M = 1.80 \pm .61$) behaviors were practiced more frequently than *Insight* behaviors ($M = 2.19 \pm .86$); ($t_F = 8.486_{(172)}$, $p = .001$; $t_H = 8.303_{(171)}$, $p = .001$, respectively).

One way ANOVA revealed differences between group means of all 3D-thinking factors according to education level ($F = 3.124_{(4,167)}$, $p = .016$ to $F = 4.432_{(4,\ 168)}$, $p = .002$). Games-Howell post hoc analysis found that *Hindsight* behaviors of four-year degree holders ($M = 2.27 \pm .63$) were practiced significantly less than respondents with Post-professional Master's ($M = 1.66 \pm .62$, $p = .010$) and Academic/research doctorate's ($M = 1.62 \pm .46$, $p = .007$). *Foresight* behaviors were practiced significantly less by four-year degree holders ($M = 2.13 \pm .54$) than those with Academic/research doctorate's ($M = 1.49 \pm .68$, $p = .013$). And *Insight* behaviors were practiced significantly less by four-year degree holders ($M = 2.58 \pm .75$) than those with the Post-professional Master's degree ($M = 1.96 \pm .84$, $p = .046$).

One way ANOVA revealed differences between group means according to experience level ($F = 4.132_{(2,\ 169)}$, $p = .018$). Games-Howell post hoc analysis found that *Hindsight* behaviors of Young Professionals ($M = 1.91 \pm .63$) were practiced significantly less than Experienced participants ($M = 1.61 \pm .54$, $p = .009$). Independent samples t-tests of respondents found that respondents with a single credential practiced *Hindsight* significantly less than dual credentialed respondents ($M = 1.84 \pm .62$ to $M = 1.50 \pm .44$, $p = .016$).

Discussion

This investigation used the CIP™ to describe the self-reported contextual intelligence behaviors of athletic trainers. The CIP™ was found to be a valid and reliable instrument for this group of respondents. In response to the first research question, *what are the*

Table 5. One-way ANOVA and post hoc comparisons for differences of CI behaviors between education level.

CI behavior (related 3D factor)	$M_1 \pm$ SD	$M_2 \pm$ SD	*F*-value	*P*-value	Games-Howell post-hoc comparison
Diagnosis context (F)			2.433	.049	
Academic/research doctorate > four-year degree	1.29 ± .76	2.01 ± .71			$p = .022$
Mission minded (I)			5.022	.001	
Academic/research doctorate > professional Masters	1.69 ± .69	2.37 ± .92			
Academic/research doctorate > four-year degree	1.69 ± .69	2.84 ± 1.02			
Change agent (F)			5.568	.001	
Professional Masters > Four-year degree	2.20 ± .84	2.93 ± .94			$p = .046$
Post professional Masters > Four-year degree	2.17 ± .91	2.93 ± .94			$p = .041$
Clinical doctorate > Four-year degree	1.94 ± .68	2.93 ± .94			$p = .038$
Academic research doctorate > Four-year degree	1.69 ± .80	2.93 ± .94			$p = .001$
Constructive use of influence (H)			4.579	.002	
Professional Masters > Four-year degree	2.09 ± .85	2.84 ± .98			$p = .046$
Post professional Masters > Four-year degree	1.99 ± .83	2.84 ± .98			$p = .020$
Academic/research doctorate > Four-year degree	1.83 ± .86	2.84 ± .98			$p = .005$

Table 6. One-way ANOVA and post hoc comparisons for differences of CI behaviors between type of experience.

CI behavior (related 3D Factor)	$M_1 \pm$ SD	$M_2 \pm$ SD	*F*-value	*P*-value	Games-Howell post-hoc comparison
Diagnosis context (F)			5.464	.005	
Mid-Career > Young Professional	1.37 ± .64	1.86 ± .81			$p = .015$
Experienced > Young Professional	1.49 ± .81	1.86 ± .81			$p = .026$
Mission minded (I)			9.802	.001	
Experienced > Young Professional	1.75 ± .88	2.45 ± .96			$p = .001$
Influencer (H)			5.776	.004	
Experienced > Young Professional	1.58 ± .67	1.98 ± .74			$p = .003$
Change agent (F)			5.820	.004	
Experienced > Young Professional	1.84 ± .80	2.36 ± .93			$p = .002$
Constructive use of influence (H)			4.395	.014	
Experienced > Young Professional	1.81 ± .65	2.24 ± .91			$p = .003$

contextual intelligence behaviors of athletic trainers practicing in the United States? Athletic trainers reported practicing all 12 of the contextual intelligence behaviors to some degree. However, none of those behaviors were reported to be practiced with high frequency. Table 4 lists those practice frequencies from most to least. Furthermore, the 3D-Thinking aggregate of *Insight* behaviors, were reported to be practiced less than *Hindsight* and *Foresight*.

In response to the second research question, *are there differences according to respondent characteristics of the contextual intelligence behaviors demonstrated by athletic trainers?* Several differences were found. The most notable difference was athletic trainers with less experience and-or less education (novice) reported practicing several CI behaviors less than more educated or more experienced respondents. However, novice athletic trainers practiced Hindsight behaviors less frequently than their counterparts. This finding is intuitive, since, by definition, they have little to no experience to recall; and should not be construed to mean that they practiced foresight 'better.' Furthermore, this finding may not be remarkable given most repondents reported 10 *or less* years of experience. It is possible that respondents with more years of experience may report practicng CI behaviots at a higher frequency. Future studies should explore frequency of CI behaviors among AT's with significant experience.

Table 7. Independent samples t-tests of CI behaviors according to number of credentials.

	Credential holder status ($M \pm$ SD)				
CI behavior (3D Factor)	Single credential holder (ATC® only)	Dual credential holder (ATC® + PT, CSCS, EMT, etc.)	*t*-value	*df*	*p*-value
Consensus builder (H)	1.77± .75	1.41± .57	−2.065	171	.040
Mission minded (I)	2.26± .98	1.74± .76	−2.307	171	.022
Influencer (H)	1.86± .75	1.47± .41	−3.540	171	.001
Constructive use of influence (H)	2.15± .87	1.68± .65	−2.304	171	.022

In general, these findings indicate athletic trainers should practice contextual intelligence behaviors more frequently and be emphasized among less experienced athletic trainers. Therefore, our most salient recommendation is for athletic training educators to consider integrating contextual intelligence (or decision-making scenarios that include a sense of urgency and saliency related to business acumen and is distinct from clinical scenarios (e.g. EAP, on-field injury evaluation, etc.)) into professional and post-professional education. Specifically, novice athletic trainers early in socialization and transition to practice should be exposed to the contextual intelligence and encouraged to incorporate holistic decision-making models, such as 3D Thinking framework (Hindsight, Insight, Foresight) into their leadership development.

Overall contextual intelligence behaviors

Of interest was that we found none of the contextual intelligence behaviors practiced with high-frequency. This finding is different from research that reported some CI behaviors were practiced with high or very high frequency by nurses and healthcare executives [21]. This is notable since, CI has been reported to be the best predictor of success in real-life performance situations, when directly compared to Intelligence Quotient (IQ) and indirectly to Emotional Intelligence (EQ) [21,24,25].

Ten (83%) of the CI behaviors were practiced significantly less than the top two most frequently practiced CI behaviors, which were *intentional leadership* and *critical thinker*. This finding suggests that, despite being practiced, there is ample room for greater frequency of these 10 behaviors. Therefore, athletic training educators at the professional level, DAT level, and CEU level should consider developing curriculum and assessments that encourage greater frequency of CI behaviors.

It is important to note that these findings do not indicate that these 10 behaviors are not 'being practiced,' only that they are practiced with less frequency than *intentional leadership* and *critical thinker* (note: even those two were not practiced with 'high frequency'). The implications of this finding, considered

in conjunction with the differences in the reported practice frequency to other healthcare managers, are far reaching and needs further exploration. An obvious, and unpleasant, implication of this finding may be one reason why there is a scarcity of athletic trainers in leadership roles outside of education. It is possible that practicing CI behaviors with a greater frequency may help to establish Athletic Training as a viable contributor to executive level leadership within healthcare organizations, such as hospitals, and other VUCA environments. In fact, recent, research purports that CI is a valuable contributor to sustainability of entrepreneurial activities [26].

Furthermore, teaching and encouraging young professionals to learn CI earlier in their careers may enhance their professional and personal presence and help them advance their employer's values and contribute more meaningfully to their local community (increasing the *communitarian* behavior, the least practiced of all CI behaviors). This finding may also add value to conversations around burnout, work-life harmony, and difficulty adjusting to change and why some clinicians may struggle navigating uncertain or volatile organizational climates or complex interpersonal relationships.

Three-Dimensional (3D) thinking

In general, *insight* was found to be practiced less than the other two time-orientations (*Hindsight, Foresight*). We believe this finding implies a greater need for non-clinical skills in athletic training. *Insight* has been described as the ability to intuitively use an awareness of the present situation, which is informed by accurate hindsight and realistic foresight [27]. Therefore, this finding suggests that athletic trainers may have difficulty connecting lessons learned from the past (hindsight) and how those lessons could relate to the future (foresight). For example, clinically, athletic training education emphasizes managing emergency situations and making timely decisions to keep themselves and their patients safe. Interestingly, this finding suggests that this ingrained and disciplined clinical decisiveness may not transfer to non-clinical situations. There may be other explanations, but these findings could suggest that some clinician's non-clinical (leadership) education is inadequate or not emphasized enough. Practically speaking the requisite need to make real-time quick and timely organizational/business decisions, may not match-up to their ability to do so clinically. Future studies should explore if non-clinical decision making (e.g. processes and efficiency) is different than when in clinical or emergency situations.

The 3D-thinking component of CI has been reported to be the most important leadership capability needed for the VUCA world [28]. Therefore, athletic training and therapy educators may want to consider curricular strategies that incorporate developing (or practicing) *insight* with greater frequency.

Differences in CI behaviors between groups

There were no differences between males and females, nor were there any differences between respondents in the different NATA Districts. Respondents with less experience and less education reported practicing 42% and 33% of the contextual intelligence behaviors, respectively, less frequently than more educated and more experienced respondents. Respondents with only the ATC® credential reported practicing 33% of the contextual intelligence behaviors less frequently than respondents with dual or multiple credentials. It is reasonable to assume that holding multiple credentials requires additional education or training. This finding is consistent with other research that indicates greater education and-or experience tends to increase one's perception of leadership or being a leader [29] and that those with less experience feel less confident in non-routine situations [30]. However, these findings cannot be interpreted to mean that more experienced or more educated respondents are better leaders, per se, or that they are better at navigating difficult situations, but only that they recognize leadership behaviors more readily and may be more confident in practicing leadership. Interestingly, one thing that contextual intelligence is said to improve is the ability to contribute to new or novel situations. If athletic training and therapy educators emphasize contextual intelligence there may be a corresponding increase in student's recognition of practicing leadership behaviors, which may help to increase leadership confidence.

Specifically, the behaviors that were reported to be practiced at a lower frequency by novice respondents overlapped. In both cases *Diagnoses Context, Mission Minded, Change Agent,* and *Constructive Use of Influence* were lower. This finding provides understanding into some of the specific behaviors that novice athletic trainers need greater exposure to and confidence in demonstrating.

Of interest was that Asian respondents reported practicing *mission-minded* and *critical thinking* less frequently than some of the other ethnicities (e.g. White-Caucasian, $N = 189$; and Black or African-American, $N = 4$). However, that finding is not remarkable given that a case summary analysis revealed that all Asian respondents ($N = 11$) were young professionals (YP). Therefore, this difference is most likely an effect of experience (and not ethnicity) or unequal variance of the sample, or both.

Theoretical implications

Contextual intelligence is not a panacea. However, it is particularly relevant to *Domain 5, Task 1, Item s* (D5.T1.s) of the Board of Certification's Practice Analysis, which states that athletic trainers must demonstrate skills in 'providing leadership appropriate to situations and people.' [31]. This task is not unique to athletic training or therapy. The need for 'appropriate leadership' is ubiquitous to healthcare. According to Bloom's taxonomy 'demonstrating' requires an in-depth understanding that transcends the more rudimentary aspect of remembering, recalling, or describing [32]. Therefore, healthcare educators should ensure that 'situation-and-people-specific-leadership skills' be fully integrated into a curriculum. Contextual Intelligence may provide a valuable starting point for those types of skills.

Furthermore, athletic trainers need to integrate 'business practices' that promote optimal patient and employee well-being [13]. Therefore, using business practices (i.e. non-clinical skills) that promote well-being is critical to the success of clinicians. Generally, 'business practices' are not associated with 'well-being.' This may be one area where athletic training educators need to update and reframe their leadership conceptions. Approximately 8% of the BOC's credentialing exam for athletic trainers includes 'business' (e.g. leadership and other non-clinical skills) behaviors [34]. Athletic training education has historically emphasized clinical skills that directly impact patient outcomes and focus less on the business practices that could provide clinical value (patient and employee well-being) or indirect patient outcomes. Therefore, emphasizing traditional leadership skills and behaviors may not be adequate, and in fact may even detract from the capacity to navigate VUCA environments. Per the BOC's D5. T1.s, embracing leadership skills that are situation and people specific implies there should be a dynamic fluidity between a range of leadership skills and behaviors that the athletic trainer can move between with relative ease, which includes global context and international mobility.

This may require reexamining the role of traditional leadership constructs and other dyadic-based leadership theories. For example, traditional leadership lore presupposes that an environment is created and maintained by a leader. But leadership scholars report, the idea that leaders 'act on' organizations or cultures to achieve the leader's objectives is antiquated given the highly complex, nonlinear and emergent settings in which leadership occurs [33]. Therefore, despite the low representation of these types of skills on credentialing exams, [34] athletic training educators should be reminded of the importance non-clinical leadership skills are to clinical practice and professional advancement.

Limitations and future research

This was a descriptive study based on self-perceived behaviors and warrants more extensive exploration. The smaller sample size and nature of self-perception studies using a Likert scale always have a high risk of response bias, this study is no exception. Furthermore, it may be deemed unconventional to treat Likert scale responses with parametric analysis, but the practice is well documented [35]. Future studies should explore the outcomes of contextual intelligence and 3D thinking on clinical practice and professional mobility. Admittedly, these types of non-clinical skills are affective in nature and therefore difficult to assess and relying on self-reported responses complicates the ability to form solid conclusions or make recommendations. Despite its difficulty the emergent nature and the complexity of healthcare require any investigation that fosters dialogue and research. Therefore, future investigations should include exploration of these and other leadership behaviors (e.g. 'soft-skills' or meta-skills) useful in VUCA environments.

Conclusion

Sports Medicine clinicians should consider practicing contextual intelligence behaviors with greater frequency. Athletic training and therapy educators and leaders should encourage leadership development that enables clinicians to develop CI, especially *insight* behaviors. Clinicians with less experience and education seem to be less confident in or less aware of their CI behaviors. As athletic training and therapy continues to evolve it may become increasingly important to identify additional skills that will equip a clinician to navigate complex and unstable environments, including international mobility. The CI framework may provide some of the skills needed for navigating a VUCA environment.

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ORCID

Matthew Kutz http://orcid.org/0000-0003-0327-1570

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