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ORIGINAL RESEARCH

Athletic Trainers' Perceptions of and Experiences With Unlearning in Clinical and Educational Practice

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Context: Unlearning is a critical component of evidence-based practice, yet research related to its role in athletic training practice is limited.

Objective: To explore athletic trainers' (ATs') perceptions of and experiences with unlearning.

Design: Cross-sectional.

Setting: Online survey with open-ended questions.

Patients or Other Participants: Seven hundred fifteen of 6925 ATs accessed the survey (access rate = 10.3%) with 640 ATs completing it (completion rate = 94%).

Main Outcome Measure(s): We distributed a survey consisting of 8 to 10 demographic questions, 1 Likert-scale item on familiarity with unlearning, and 4 to 5 open-ended questions. Descriptive statistics summarize demographic information. Open-ended data were analyzed using the consensual qualitative research approach. Respondents who self-reported familiarity with unlearning were asked to described its meaning. To ensure data quality, these responses were compared with definitions of unlearning by 2 research team members. If consensus was reached that a participant's understanding of unlearning aligned with the definitions, the remaining responses from that participant were included in the qualitative data analyses reported in this manuscript.

Results: Most respondents were minimally or not at all familiar with unlearning (n = 505/652, 77%). Approximately 46% (n = 181/391; 120 clinicians, 61 educators) accurately described the meaning of unlearning. Analysis of open-ended responses yielded 2 themes: *barriers to unlearning* and *facilitators of unlearning*. Reported barriers were intrinsic and extrinsic in nature and involved key stakeholders that frequently interact with ATs. Facilitators of unlearning included continued education, mentorship and team mindset, resources and evidence, and stakeholder education.

Conclusions: Respondents were largely unfamiliar with unlearning despite its role in promoting evidence-based practice. Continued education for ATs and relevant stakeholders is needed and may be accomplished through the creation and dissemination of accessible resources that highlight knowledge and skills that should be unlearned. These educational efforts may help to normalize unlearning in athletic training practice to continually improve the delivery of patient care.

Key Words: evidence-based medicine, behavior change, habitual practice

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KEY POINTS

- Most athletic trainers were minimally to not at all familiar with unlearning, highlighting the need for continued education in this area.
- The most frequently cited barrier to successful unlearning was pushback from stakeholders, which was often rooted in stakeholders' lack of knowledge regarding evolving health care practices.
- In addition to communicating new knowledge, knowledge producers are encouraged to equally emphasize and disseminate resources that highlight outdated skills and techniques to promote unlearning.

INTRODUCTION

The concept of evidence-based practice (EBP) involves the integration of the best available evidence, clinician expertise, and the patient's goals and circumstances into the delivery of health care services.[1] However, clinicians can become reliant on habitual practice patterns that are not congruent with the current evidence, or patients can request treatments in their plan of care they have received previously but that might not serve to optimize their treatment plan.[2] In such cases, unlearning is necessary to allow the clinician to determine the right course of treatment and achieve quality improvement in the delivery of care.

While the development of new knowledge is fundamental to the progression and transformation of all health care fields, the unlearning process is equally vital in the evolution of health care services. Unlearning involves the intentional effort to reform and reshape our disciplinary legacies to allow for the reinvention of our fields of practice.[3] Halberstam states, "Unlearning is an inevitable part of new knowledge paradigms if only because you cannot solve a problem using the same methods that created it in the first place."[3(10)]

Three types of unlearning exist: routine (or fading), directed (or wiping), and deep.[4] Routine unlearning occurs when past learning is forgotten or fades away.[4] In athletic training, routine unlearning of therapeutic modalities may occur if an athletic trainer (AT) is hired at a high school that does not have the budget to purchase this equipment. Lack of use can lead to fading of this knowledge over time. Since unlearning requires conscious action, the idea of fading as a form of unlearning has been questioned[5] and may instead be referred to in the literature as deskilling.[6] Directed unlearning is different in that it requires intention and is typically triggered by functional and deliberate alterations in habitual activities[4] or when a change in a system forces a change in a process. For example, suppose an athletic training facility has purchased a new modalities unit to replace an older unit. Clinicians may initially struggle with setting up the desired parameters, and the treatment administration may take longer than usual for the first few uses due to changes in the unit interface. However, after repeated use, clinicians will begin to unlearn how they used the previous modality unit, and their treatment with the new unit will become fluid and habitual. Deep unlearning occurs in situations that result in a profound break, sometimes suddenly, with past knowledge.[4] An example of deep unlearning would be an AT and urgent care facility medical staff who are unfamiliar with Paget-von Schrötter syndrome but have a learned understanding that upper extremity deep vein thrombosis occurs in the dominant limb. If a patient presents with symptoms mimicking deep vein thrombosis but in the nondominant arm, these clinicians may misdiagnose a patient's signs and symptoms as another condition based on their learned understanding, thus potentially threatening limb or life.[7] Deep unlearning challenges ingrained understanding and beliefs and can be painful to experience.[4] Ideally, if the clinician is open to unlearning, it can occur through routine or directed mechanisms; however, lack of awareness and conscious efforts toward unlearning can result in the clinician experiencing deep unlearning because of an adverse patient outcome.

The unlearning process can prove overwhelming to many clinicians, including ATs, as it requires the clinician to break habitual practice and attempt new practice without knowing what outcomes will result. It requires an openness to new knowledge and a willingness to acknowledge mistakes.[4] It can ultimately cause a clinician to distrust their abilities if not consciously attempted through routine mechanisms.[4,8] Very little research exists on the concept of unlearning in athletic training, despite its importance to the profession's advancement through routine use of evidence-based techniques and subsequent improvements in patient outcomes. Capturing ATs' unlearning experiences may provide valuable insight into how this process can be optimized across the athletic training profession. Thus, this study aimed to explore ATs' perceptions of and experiences with unlearning.

METHODS

Design

We used a cross-sectional survey design that included open-ended questions to explore ATs' perceptions of and experiences with unlearning. The A.T. Still University Institutional Review Board deemed this study as exempt research.

Participants

For this study, we recruited (1) a random sample of 6000 certified ATs who practiced clinically and were in good standing as members of the National Athletic Trainers' Association (NATA), and (2) a purposeful sample of all certified ATs who were in good standing as members of the NATA and self-reported as an educator in the college or university setting ($N = 950$).

Figure 1. Flow of open-ended survey items.

Instrumentation

We conducted a comprehensive literature search and could not identify an established survey instrument to address our research aims. Therefore, we developed a Qualtrics survey (Qualtrics, LLC) to explore ATs' perceptions of and experiences with unlearning. The survey consisted of 8 to 10 demographic questions, 1 Likert-scale item on familiarity with unlearning, and 4 to 5 open-ended questions (Figure 1). Due to survey logic, it was possible that not all participants received every survey question depending on how they responded to particular survey items. Additionally, while the stem of each survey item was the same, participants were first asked to identify their primary role (ie, clinician, educator, equal split as clinician and educator) and then received the remaining items that were uniquely worded for that role. If a participant selected *equal split*, they were asked if they preferred to answer the survey questions based on their time as a clinician or educator.

After development, we sent the survey to 4 ATs for face and content validation; 2 ATs primarily serve as educators and have survey development expertise, 1 AT primarily serves as a clinician, and 1 AT serves in an equally split position as a clinician and educator. Based on the feedback from the content reviewers, we revised the wording of 2 survey items, added 1 demographic question, and provided additional selection responses to 2 demographic items to ensure inclusivity. Next, we pilot-tested the instrument to confirm survey-item comprehension and determine the estimated completion time. The survey was sent to 18 athletic training clinicians that were not included during data collection; 10 ATs completed the survey. We made no additional edits based on pilot-testing feedback, and the estimated time to complete was confirmed to be 10 to 15 minutes.

Procedures

In June 2020, an e-mail was sent by the NATA survey research service on our behalf to the sample of 6950 ATs that met our inclusion criteria. During distribution, 25 e-mails were returned as undeliverable; therefore, 6925 e-mails were sent to potential participants. The e-mail included a brief overview and purpose of the study, the estimated time of completion, and a URL link to the Web-based survey. Participants were given 4 weeks to complete the survey voluntarily, and reminder e-mails were sent weekly to those who had not yet completed it. Participant consent was implied upon voluntary completion of any portion of the survey. To comply with

the guidelines of exempt research and survey research best practices, participants were not required to complete every survey item and could opt out of responding to any question if they chose.[9,10]

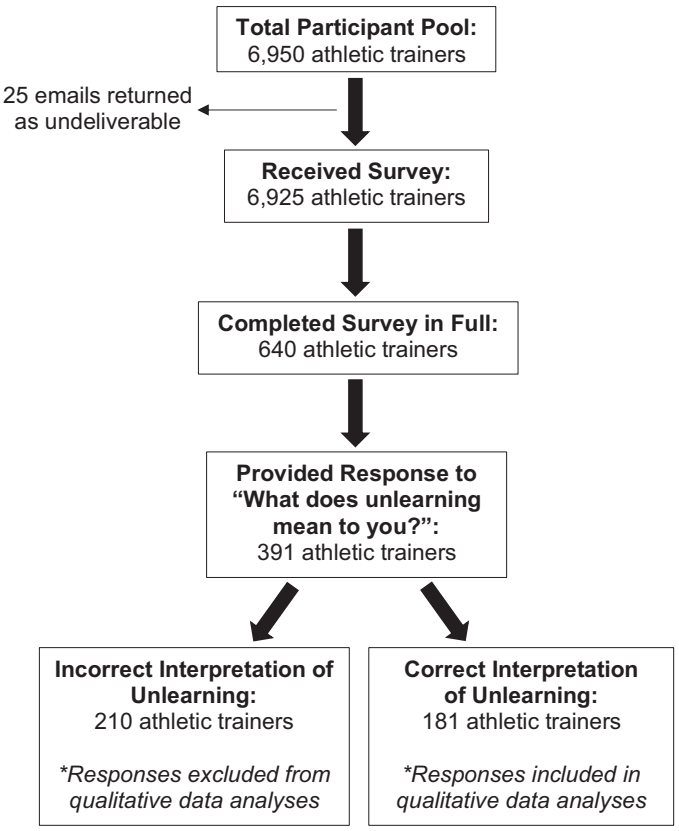
Data Analysis

Descriptive statistics were conducted in SPSS (version 27; SPSS Inc) to characterize participant demographics and the Likert scale item, while open-ended items were analyzed following the consensual qualitative research (CQR) analysis process.[11,12] The research team, a fundamental element of CQR, was comprised of 4 ATs; all had experience with qualitative methods and CQR.

To ensure the richest data sources were included as we explored ATs' experiences with unlearning, we used a stepwise progression to determine the inclusion of responses. Participants who self-reported as *minimally*, *moderately*, or *extremely familiar* with unlearning were then asked to describe what unlearning meant to them. We conducted an in-depth review of the responses to this open-ended item and assessed the accuracy of each response using 2 definitions of unlearning that align with other peer-reviewed literature as a guide. The definitions were "the process of reducing or eliminating preexisting knowledge or habits that would otherwise represent formidable barriers to new learning"[13] and "the process of letting go of, moving away from, and reframing once-useful mindsets and acquired behaviors that were effective in the past, but now limit our success."[14] Both of these definitions align with the definition of unlearning published in a peer-reviewed article by Hislop et al.[5] If we reached consensus (2 research team members indicated unanimous agreement) that a response aligned with the meaning of unlearning based on the definitions above, the remaining responses to the open-ended items from that respondent were included in qualitative data analyses.

To ensure the data were viewed from multiple perspectives, 3 research team members used the consensus approach within CQR during analysis. First, each team member individually coded the first 20 participant responses and independently created an initial codebook. The team then met to discuss the individual coding and develop a consensus codebook. Next, each member independently coded the subsequent 30 participant responses using the consensus codebook. The team then met again to discuss the coding and to confirm the consensus codebook. One member then coded the rest of the responses and sent the coded responses to the other 2 members who met to confirm the codes. Once the codes for all participant responses were finalized, the fourth member of the research team, who served as the external auditor, reviewed the consensus codebook and the coded data to ensure the findings adequately represented the participants' unlearning experiences. Frequency counts were calculated to determine the prevalence of themes across the sample.[12] Themes representative of 130 or more participant responses were categorized as *general*. Themes with 72 to 129 participant responses were categorized as *typical*, followed by *variant* (29 to 71 participant responses) and *rare* (28 or fewer participant responses). Finally, to provide an accurate and comprehensive reporting of the qualitative results of this study, we consulted the Consolidated Criteria for Reporting Qualitative Research assessment tool.[15]

Figure 2. Flow diagram of the study sample.



RESULTS

Of the 6925 ATs who received the survey, 715 accessed it (access rate = 10.3%), and 640 ATs completed the survey in full (completion rate = 94%; Figure 2). Approximately one-third (n = 216/652, 33.1%) of respondents indicated they were not at all familiar with unlearning; 44.3% (n = 289/652) selected minimally familiar; 20.7% (n = 135/652) selected moderately familiar, and 12 respondents (1.8%) indicated they were extremely familiar with unlearning. When reviewing respondents' interpretations of unlearning (n = 391), approximately 46% (n = 181; 120 clinicians, 61 educators) accurately described its meaning and were included in the data analyses summarized in this article. Most respondents were female (n = 118, 65.2%). The average age of respondents was 37 ± 11 years, and they had collectively been certified as ATs for an average of 14 ± 10 years (range = 1 to 45 years) at the time of survey completion. Additional demographics are in Table 1.

Analysis of open-ended responses revealed 2 themes: *barriers to unlearning* and *facilitators of unlearning* (Figure 3). Each theme was further separated into categories and subcategories where applicable. Table 2 outlines the number of participant responses per category. Participant quotes supporting categories and subcategories that emerged for the barriers and facilitators themes are in Tables 3 and 4, respectively.

Barriers to Unlearning

Respondents identified barriers to unlearning that were separated into 3 categories: *intrinsic barriers*, *extrinsic barriers*, and *stakeholder considerations*.

Table 1. Respondent Demographics (n = 181)

Parameter	Value
Primary role, No. (%)	
Clinician	120 (66.3)
Educator	61 (33.7)
Sex, No. (%)	
Male	61 (33.7)
Female	118 (65.2)
Prefer not to disclose	2 (1.1)
Route to Board of Certification, No. (%)	
Internship (before 2003)	35 (19.3)
NATA-approved curriculum (before 2003)	24 (13.3)
CAATE-accredited athletic training program (post-2003)	122 (67.4)
Highest degree earned, No. (%)	
Bachelor's degree	16 (8.8)
Master's degree	106 (58.6)
Academic doctorate (eg, PhD, EdD)	50 (27.6)
Clinical doctorate (eg, DAT)	9 (5.0)
	Mean ± SD
Age, mean ± SD, y	37 ± 11
Years certified as athletic trainer, mean ± SD	14 ± 10
Years in current position, mean ± SD	6 ± 7

Abbreviations: CAATE, Commission on Accreditation of Athletic Training Education; NATA, National Athletic Trainers' Association.

Intrinsic Barriers. Intrinsic barriers are those that are within ATs' control. Some respondents specifically identified their *decision-making processes* as a barrier to successful unlearning. The unlearning process requires reshaping beliefs and challenging previous knowns or ways of doing things, which at times, was difficult to achieve. For example, one AT said, "Sometimes I was nervous to try the new practices… I would have to remind myself that the new best practice will give my athletes the best outcome." Another respondent mentioned a lack of open-mindedness as a barrier and how that affects decision-making processes. The participant wrote:

> *One has to be willing to reexamine things and look at them differently. It also takes that type of critical thinking mindset in order to admit that you can do things better and that you may need to change how you are doing things.*

When reflecting on barriers to the unlearning process, another participant noted, "For me… just a complete mental shift away from many of the things I had seen my mentors and preceptors do as far as treatment/rehab went."

Another common intrinsic barrier to unlearning was *habitual practice*. Participants frequently described the tendency to rely on previously used skills or techniques instead of adapting their practice over time. One AT said, "It is uncomfortable to change how you have done things previously or admit that you have done things in a way that was less than ideal. It takes effort and work." Similarly, another respondent discussed the role of comfort in the care process and referred to a barrier as "the tendency to fall back to what you know or have been comfortable providing. Unlearning will take you out of your comfort zone." The habitual practice barrier also encompasses the subconscious process of being on autopilot mode. Referencing this behavior, an AT said, "[S]ometimes those concepts are still the first to pop into my head and start to come out of my mouth. I have to be diligent to not go on autopilot but really think through what I am saying."

The last intrinsic barrier discussed by respondents was *keeping up with the available evidence*. Participants discussed the inability to stay informed on changing recommendations, both from the pace at which new information is disseminated as well as access to current evidence that supports these changes. Put simply, one respondent wrote, "[H]aving the time and ability to keep up with relevant literature in regard to new techniques is challenging at times." The time it takes for research to be disseminated to consumers was also discussed. One respondent expanded on this affecting the unlearning process:

> *I think the biggest barriers are sifting through and learning new information. Due to the lag in time of research completion*

Figure 3. Overview of themes and categories.

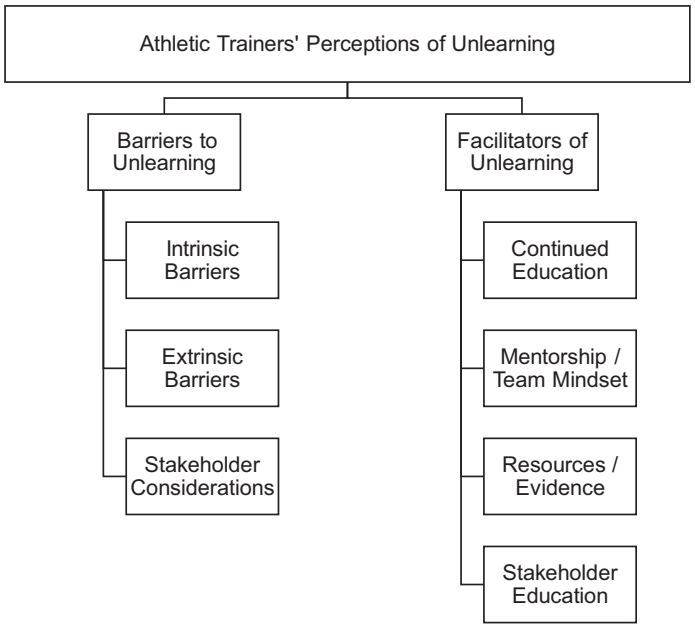


Table 2. Participant Cases by Category for Themes 1 and 2 (N = 144)

Theme and Category	Frequency	No. of Participant Cases
Barriers to unlearning		
Intrinsic barriers	Variant	64
Extrinsic barriers	Rare	19
Stakeholder considerations	Typical	108
Facilitators of unlearning		
Continued education	Variant	39
Mentorship and team mindset	Variant	32
Resources and evidence	Variant	57
Stakeholder education	Rare	11

Table 3. Theme 1 Categories and Supporting Quotes

Theme	Categories	Subcategories	Supporting Quotes
Barriers to unlearning	Intrinsic barriers	Decision-making processes	"The biggest barrier was going against what I had learned in schooling. . . and being able to realize that it is okay to have those modifications."
			"Facing internal biases of my own."
			"If I wanted to systematically check how I perceive different 'knowns,' I would like some hard data about my own decision making (Ex. Are there biased factors I use in choosing whether to make a referral?)."
			"The only barrier/challenge I met was in my own process of breaking down and re-shaping my beliefs around rehab/training."
			"Me. It is easier to retain practice patterns that are associated with overall positive outcomes (natural history can offer a false sense of effectiveness) than study, learn, accept being wrong, and try new, evidence-reasoned approaches."
			"Only challenge is being willing and open to new information."
			"Feeling uncomfortable with not knowing or the realization that accepting a new truth might call into question many other things that you might be doing."
		Habitual practice	"Attachment to longstanding beliefs, both conscious and unconscious."
			"When you practice and use a specific knowledge or technique for years, it's hard to transition the thought process from the automatic."
			"Years of older non-EBP clinical practice had a lot of repetition."
			"Initially it was a habit to just go right to one or two exercises or modalities for time sake. . . it was tough breaking that habit in the beginning and think more outside the box."
			"Habits typically interfere and trying to change your way of say doing an evaluation because it has been such a checklist."
			"Probably not being so stuck in the past. I admit I had some of that approach to things."
			"It is uncomfortable to change how you have done things previously or admit that you have done things in a way that was less than ideal. It takes effort and work."
		Keeping up with available evidence	"Energy and effort to find accurate and appropriate resources."
			"If anything, just keeping up with the changes."
			"I think there is always a challenge to stay on top of current best practices. It's critical that educators stay up to date on evidence-based trends in the field to make sure they are teaching the most up to date information."
			"Specifically with concussion, it can be frustrating at times to have to unlearn minor facts or management practices as we continue to learn more about concussions through research and establish best practices or a better standard of care."
			"Information changes quickly due to constantly new research."

Table 3. Continued

Theme	Categories	Subcategories	Supporting Quotes
	Extrinsic variables	External variables	"One of the biggest barriers is finding the research."
			"Available education and free research. A lot of research costs money to review."
			"The varied scopes of practice."
			"The BOC exam to me is the biggest challenge. . . There's a part of me that feels I have to cover concepts and things, even if they're rarely if ever used in clinical practice anymore."
		Time	"Sorting through and appraising new evidence sometimes can be time consuming, so that is a big barrier."
			"Researching trends requires time that many people often don't have."
			"It takes time to unlearn things. . . so having the time to keep appraised of new changing information."
			"The challenge is to find the time to learn, implement, and reflect."
			"The biggest barrier was time management."
	Stakeholder considerations	Pushback	"My barriers were relaying this information [new knowledge or techniques] to physicians and PAs [physician assistants] that I work with who were somewhat less receptive to abandon their prior knowledge."
			"Old school clinicians in supervisory roles who are uncomfortable with new ideas."
			"Mainly, pushback from patients/athletes and coaches. As much as we try to educate them, they think they know what's best."
			"Athlete, coaches, and coworker resistance. Many people continue to believe outdated modalities will solve their issues."
			"Challenges would be 'this is the way we've always done it' mindset. Getting people/ colleagues on board."
			"Pushback from administration and supervisors who are older than me who have always done things the 'old school' way."
			"The barriers were to convince my colleagues that we should follow the evidence and not do what we have always done before."
			"Parents and coaches still believe ice is best and will challenge me on my home care instructions."
		Education	"I have a former colleague that still uses ice and stim for everyone that complains of pain or an injury, and he doesn't try and get continuing education to stay up to date with best practices."
			"It became cumbersome to try and re-educate the masses to justify my clinical practice patterns. I had to explain why I didn't think they should ice or why it has a negative effect each and every time."
			"Getting experienced preceptors to buy in, so that students could see the best tests to perform from an EBP perspective. . ."
			"The biggest challenge here was messaging the changes in concussion management to coaches and administrators and helping them unlearn what they thought to be true."

Table 3. Continued

Theme	Categories	Subcategories	Supporting Quotes
			"The need to continuously re-educate stakeholders."
			"Proving to people why we needed to unlearn it. Getting them to understand and buy in."
			"Getting athletes and coach to understand why we are changing things we have done for 100 years."
			"Educating my patients, especially if other clinicians are doing things differently."

Abbreviation: BOC, Board of Certification; EBP, evidence-based practice.

to publication, sometimes you may be reading a new research article that is actually showing older data.

When analyzing participant responses, it became apparent that barriers to unlearning were multifaceted, and ATs can experience more than one simultaneously. A respondent summarized the intrinsic barriers to unlearning by saying, "So having the time to keep apprised of new changing information and being deliberate about being open-minded and thinking [about] your way of changing things."

Extrinsic Barriers. When reflecting on barriers to unlearning, respondents mentioned extrinsic barriers or things outside of their direct control. Responses referred to various *external variables* as barriers to the unlearning process, with a specific emphasis on *time*. While little consensus among ATs occurred on the particular external variables that prohibited unlearning (eg, Board of Certification exam, varied scopes of practice, cost to access research, resources), it became apparent that factors beyond ATs' control impede the unlearning process. For example, one respondent reflected on the lack of necessary resources to practice according to evolving research:

A lot of newer research has been 'equipment' based that we don't have currently (ie, blood flow restriction therapy devices). A lot of the research demonstrates good results with this; however, we do not have the equipment; therefore, I continue to use previous[ly] learned techniques.

Multiple respondents identified time as a barrier to unlearning beyond their control. With the demanding schedule of ATs, both those practicing clinically and those in education, respondents found it challenging to find time in the day to keep up with the evidence that would promote unlearning. One participant put it simply, "Time... so I could be properly updated," while another wrote:

There is time needed to synthesize new information, unlearn, and implement new [knowledge or techniques], and I sometimes am impatient with the process because of demands to use the new learning. The recognition for the need to unlearn can be slow.

Stakeholder Considerations. The most frequently cited barrier of unlearning involved stakeholders with whom ATs interact as part of their role. Though ATs should have complete autonomy regarding the care they provide, respondents were transparent that *pushback from stakeholders* was a key barrier to successful unlearning. The source of this pushback was widespread, including other clinicians, colleagues or coworkers, parents, coaches, athletes or patients, and supervisors. One AT reflected, "... coaches having an idea of the best way to do things and not being open to new approaches for fear it won't work as well. Sometimes it's easier to just do what you've always done." Another respondent highlighted the challenge of others being stuck in the past when they wrote, "Well, most of the barriers were and still are with parents and coaches who say stuff like, 'Well, back in my day...,' or 'It's just a bell ringer.'"

The pushback appeared, at times, to be the result of outdated information and knowledge. *Stakeholder education*, or lack thereof, was an evident barrier to the unlearning process. One respondent recalled, "... resistance from coaches, parents, student-athletes, doctors, and others because they are not informed on the new best standard of care." Concussion management and treatment is just one of many areas that have evolved over the years, and getting stakeholders on board has been a challenge for some. A respondent expands on this challenge with the following:

The biggest barriers were getting coaches and athletes to understand why the changes were made and why they are in the best interest of the athlete. Working with old-school coaches made it difficult to explain to them that the old way of returning an athlete from a concussion was no longer the standard of care.

Similarly, another respondent wrote:

I had to deal with not only my own previous knowledge but the previous knowledge of athletes and parents as well. As they don't have access to the same tools that I do, getting them to understand why we are doing what we do from our return-to-play protocol often causes confusion.

Stakeholders' lack of knowledge challenged ATs' abilities to provide contemporary patient care and affected administrative components like policies and procedures. In support of this challenge, a respondent said, "The barriers have been mostly external when trying to change policies or explain to stakeholders such as parents or administrators why things have changed." Overall, barriers to unlearning were multifaceted and involved aspects within and outside ATs' control.

Facilitators for Unlearning

Despite existing barriers, respondents discussed various strategies to promote the unlearning process. These strategies were separated into 4 major categories: *continued education*, *mentorship and team mindset*, *resources and evidence*, and *stakeholder education*.

Table 4. Theme 2 Categories and Supporting Quotes

Theme	Categories	Subcategories	Supporting Quotes
Facilitators of unlearning	Continued education	NA	"I think a greater emphasis in new research, and especially in continuing education programs, to compare and contrast what current research shows with previous research and common practices."
			"Better understanding of why I need to unlearn something, more information."
			"I need to have dedicated time to professional development and self-education. When I am too busy, it is easy to rely on old patterns and not consider a new way."
			"Staying more up to date and taking more time to stay current with research."
			"Learning what unlearning is and practicing scenarios that use real life examples. People need to be educated on it first."
			"Focus on educating both myself and others. I think if there is concrete evidence presented to anyone, myself or the patient, it becomes more of a motivator to change and the conviction is greater."
			"I have also learned that to stay viable professionally, I have to eagerly engage in current research and embrace. . . ever changing techniques."
	Mentorship and team mindset	NA	"I look at research and I talk with my fellow ATs. . . I have friends who do research, and they send me ideas and we discuss how to implement things within reason."
			"Thankfully, I have a very supportive staff that allows for creative ideas and is open to teach me and learn from me along the way."
			"More overall consensus in the athletic training community on habits/thoughts that should be unlearned."
			"Working with others that are willing to work together on unlearning together."
			"Mentors with open minds."
			"A large cohort of peers to hear different opinions from."
			"Faculty groups with others trying the same thing! When people are there as support, more unlearning is possible!"
			"I think colleague interaction and discussion is invaluable when trying to unlearn. To have others who support the process and can talk through it so that it makes sense and reinforces the idea to everyone."
			"More opportunities for wide open discussion among other educators."
	Resources and evidence	Availability of resources and evidence	"Evidence! Easier access to the evidence because sometimes it is hard to find because I can't spend all my time reading."
			"More access to information and changes in different policies and practices would allow the process of unlearning [to] progress and move quicker."
			"Multiple facets to receive the information."
			"Access to databases with articles and ability to input questions."
			"Free access to all scientific scholarly work."
			"I think having evidence available to me to learn new skills and knowledge was instrumental, so that continued access would help facilitate unlearning."
			"Continue to promote evidence informed information."

Table 4. Continued

Theme	Categories	Subcategories	Supporting Quotes
		Types of resources and evidence	"I think it would be helpful to have more clinical best practices documents." "I suppose more exposure to new ideas might help. . . Examples or success stories might promote accepting a new idea more readily, though, too." "Consensus statements that clearly outline the evidence on the topic." "Evidence through RCT and retrospective studies facilitate the unlearning process in health care professions and the clinical practice of athletic training." "Maybe educational materials that we could hang in our clinics or distribute when needed." "Infographics are quick and easy ways to get out information in an interesting way." "Research that supports new learning/unlearning as well as practice/reminders about the change."
	Stakeholder education	NA	"Explaining my reasons [for practice-related decisions] from the get-go." "Making sure AT staff members are all on the same page with various rehabilitation protocols." "Get others, from preceptors. . . and some fellow faculty members to understand the new concepts and methods. Worked by holding joint training/ educational sessions with our clinicians and local EMS providers to help overcome and introduce the new best practices." "Educating everyone and not just those professionals who seek further knowledge in research and clinical experience." "For concussions specifically, continued education of physicians, coaches, athletic directors, athletes, and parents." "Streamlining new research to coaches/athletes."

Abbreviations: AT, athletic trainer; EMS, emergency medical service; NA, not available, RCT, randomized controlled trials.

Continued Education. Participants mentioned education on what information, skills, or techniques should be unlearned and why the information should be unlearned as a key facilitator of unlearning. One respondent simply wrote, "... education throughout the profession on what tasks/ information need to be unlearned." Another respondent expanded on this facilitator as a helpful way to challenge existing knowns:

> *I feel, when I'm provided with enough information, I can easily unlearn prior ideas and practices. In fact, I actually enjoy having prior ideas disproven, particularly if they don't work or don't make sense in the first place.*

The importance of being open and receptive to continued education was also emphasized. One respondent reflected on their personal practice as an AT and how continued education has helped to shape their overall philosophy, writing:

> *One of the biggest reasons I believe I am a good [AT] today is because I am open to every idea and piece of research that is put in front of me. I believe, if I am doing the same thing to treat an injury now than I was 5 years ago, that I am not doing it the best and most effective way. Medicine is always changing, and with that, [ATs] need to adapt and accept and even help facilitate that change by asking questions about why I am doing what I'm doing for those injuries and if there are new modalities, tools, and ways to progress and treat those injuries better.*

While some respondents have personally experienced continued education as a facilitator of unlearning, others were more prescriptive in their responses, describing what they would like to see in the future, like:

> *A logical approach to provide rationale for why information needs to be unlearned would be helpful. For example, it would be easier to accept the change if the information that needs to be learned is identified, information why that [current knowledge, skill, technique] is incorrect, or why the new information needs to be learned, and then application to a real scenario. This strategy would help me internalize this change, help me process why I need to unlearn it and*

see how that directly relates to improving my practice/teaching/actions.

Mentorship and Team Mindset. Participants also talked about the role of mentorship and a team mindset in the unlearning process. Specifically, mechanisms or forums for open discussion among ATs to learn from each other and have a space to bounce ideas off one another were emphasized. In addition to collaborating with others, the role of a mentor to facilitate unlearning was also mentioned. When asked what would facilitate the unlearning process, one respondent wrote:

. . . a mentor with similar knowledge/processes of unlearning in general; being able to have open forum discussion with others in the field to gather more information and perspectives on various situations/ideas/actions.

Similarly, another respondent recalled the benefit and enjoyment of working with others, saying:

. . . having others to talk through it all with. When you are the only one you know going on the journey of a specific thing, it can get a little confusing or lonely. I love bouncing ideas off people and talking with someone to flush out what's up there!

Participant responses revealed that what should be unlearned is essential, but the why is just as important. When discussing team mindset as a facilitator for successful unlearning, one respondent spoke to the why, writing the following:

The unlearning process was facilitated by the aid of others around me that had a similar mindset and vision. When I was surrounded by people that I respected and that wanted to fight for this common goal/mindset together (even if we did not believe in it to begin with), it eased the process. I also think that, by having these individuals, it allow[ed] conversations to be had regarding the importance of these changes. The 'why' has always helped me adapt and unlearn items and learn new items.

Overall, the process of unlearning information, skills, and techniques was not as daunting when approached as a collaborative initiative with the space to openly discuss the whats and whys.

Resources and Evidence. The most frequently cited facilitator of unlearning was related to resources and evidence, specifically the *availability of resources and evidence* and *types of resources and evidence*. Participants identified the importance of having access to reputable sources and databases that house evidence-informed information so that this information can be digested and subsequent changes to practice can be made. For some, the need to pay for access to peer-reviewed articles was a barrier, highlighting the need for more effective and accessible ways to disseminate information. A facilitator of unlearning includes "having accurate and up-to-date information from reputable sources available to me at all times. Specifically, those journals and articles that hide behind a paywall." Another respondent echoed concerns about the availability of evidence with clinical applicability, describing a facilitator of unlearning as "continued promotion of the latest and most relevant literature in digestible chunks that make clinical application easier than reading a 20-page article." Since the unlearning process starts with acquiring new knowledge, having access to the new knowledge is critical for successful unlearning. A respondent spoke about the importance of access with the following: "Once I find new information, I can replace old information, so I guess it comes down to the availability of information and time it takes to obtain new information."

In addition to availability, participants discussed different types of resources and evidence that would facilitate the unlearning process. Consensus occurred among our sample that the preferred method for obtaining information is not the traditional lengthy research article but rather visually appealing and easily digestible documents. One respondent said, "Having handouts and flow sheets of new information is very helpful to me. This allows me to refer back to a visual when I am second-guessing myself." Participants spoke about the role of professional organizations in creating these easy-to-digest resources. One respondent said, "NATA supplies infographics that are easy for athletes, parents, coaches, and admin[istration] to understand and read." Another wrote:

I think short easily digestible pieces of information would help. Posts on social media or statements from overseeing organizations can help get the word out that maybe unlearning needs to happen.

Though some respondents preferred visual resources, others talked about the usefulness of traditional evidence sources in promoting the unlearning process: "I think broad distribution of critically appraised topic/papers would be exceptionally helpful for all ATs. . . ATs would save on the time needed to research [the] topic themselves." Another respondent mentioned the desire for "continued updated position statements to reflect changes [in best practice guidelines]." When new information, evidence, and updated practice guidelines are widely accessible and presented in a manner that promotes clinical applicability, ATs are more easily able to unlearn and adjust their practice behaviors according to the evolving evidence.

Stakeholder Education. The last facilitator discussed by participants was the need for stakeholder education. Due to frequent pushback from stakeholders, the emphasis on stakeholder education involved getting key personnel (eg, coaches, athletes, patients, parents) to understand why changes are being made. Taking the time to educate stakeholders and demonstrate the value of the change could lead to less resistance and successful completion of the unlearning process. One respondent talked about the need to educate athletes on the decreased use of ice, explicitly mentioning that unlearning should be occurring among the athletes, writing:

I think the unlearning needs to be with the athlete population. Typically, kids. . . are told to ice and ibuprofen every pain, so when they get to college, they think that's what they need. Some athletes are responsive to the change in behavior, while others are not.

Another AT discussed the effectiveness of educating coaches and athletes on the evolving evidence surrounding ice as the primary modality for recovery, recalling:

Providing coaches with general recommendations for post-practice recovery without ice baths has also been a very successful way to move away from that [use of ice]. Educating

athletes has always been effective when they understand what the potential cause and effect is... my athletes have notice[d] my shift away from ice for everything and asked me about it... when I explain it [my reasoning], they don't want to use it [ice] anymore.

Other respondents were brief in their explanation of stakeholder education as a facilitator, simply stating, "[K]eep educating your athletes and coaches, and it will eventually stick," and "[H]elp with educating our clients/athletes to help the unlearning process be successful." Overall, education of self and others, brainstorming and talking to peers, and broad access to easily digestible and applicable resources were described as strategies to facilitate the unlearning process in professional practice.

DISCUSSION

In our investigation, we confirmed the relative unfamiliarity with unlearning across the athletic training profession and highlighted the need for widespread education on the concept and process. Given the role of unlearning in professional development and continuing education, increased awareness of this process at all levels, including professional, postprofessional, and residency would be beneficial. Beyond increasing knowledge and awareness, our findings also highlight the importance of developing positive attitudes toward unlearning—both of which may be achieved through creating and disseminating easily digestible and accessible resources for ATs.[16,17]

Education on Unlearning

With unlearning being a relatively new concept in athletic training, it is unsurprising that the need and desire for additional education on the topic was a shared sentiment among participants. Athletic trainers identified education or lack thereof as both a barrier to and a facilitator of unlearning. Beyond the foundational information of what unlearning is and why it is important, our findings highlight an apparent need to specifically educate stakeholders, including ATs, on the intersection of unlearning and EBP. Without first identifying and moving away from outdated techniques, ATs will be unable to truly practice contemporary patient care. Enhanced knowledge and understanding of the unlearning process may help overcome the barriers of habitual practice and decision-making processes rooted in a fixed mindset (eg, "This is the way things have always been done").

Part of EBP involves considering patients' preferences, perspectives, and goals,[1] highlighting the need to consider the evidence in context. Interestingly, tensions between evidence and context have been identified as part of the challenge to unlearn.[18] Physicians reported struggles with changing practice when guidelines did not apply to particular patients, and when such tensions existed, they left the decision making up to their patients.[18] Participants in our study referenced the desires and values of patients and other individuals (eg, coaches, parents) as a barrier to successful unlearning rather than an important component of the individualized care process. Pushback from stakeholders when deviating from perceived standard care (ie, what the stakeholders were used to and expected) appeared to be augmented by their lack of knowledge of the evolving evidence and its effect on changing practice guidelines. This raises questions about the role of patient or stakeholder education in the care process. To enable patients to feel empowered to be active participants in the decisions surrounding their care, it is our responsibility to not only educate them on treatment options but also communicate changes to practice guidelines, so they understand the care being provided aligns with what the evidence shows is most effective.

For example, some participants discussed unlearning the use of ice to promote recovery and soft-tissue healing and indicated that others, such as athletes, patients, and coaches, need to unlearn this as well. Recent evidence has increasingly challenged the effectiveness of cryotherapy on promoting recovery.[19–21] However, traditionally, ice has been heavily relied upon as a treatment modality within and outside the athletic training profession, so moving away from it requires a sizeable cultural shift for everyone involved. To support this cultural shift, ATs can and should use patient encounters as educational opportunities about evolving evidence and explain how changing recommendations affect the type of care provided to patients. Capitalizing on these encounters in this manner may reduce stakeholder pushback while also promoting patient autonomy by allowing patients to make better informed decisions regarding the care they wish to receive.

The importance of increasing awareness of and education on unlearning spreads beyond clinical practice and the point of care. For many reasons, some of which were disclosed by participants in our study, unlearning can be challenging to complete; in part, because it disturbs the status quo equilibrium.[18] For many, unlearning requires a shift in mindset, which can take years to achieve. As a result, early exposure to the concept of unlearning is paramount. In the same way that clinicians should educate patients on the unlearning process and the positive effect it can have on patient care, athletic training educators should introduce students to the concept of unlearning, including its intersection with EBP. The earlier students are exposed to this information, the more comfortable they will become with incorporating this process into practice once knowledge and skills become outdated. As more students with this background knowledge graduate and enter the workforce, we hope that unlearning will become an increasingly executed and accepted practice.

Attitudes Toward Unlearning

When sharing experiences with unlearning, participants frequently alluded to a change in attitudes and mindset as a necessary precursor. Some ATs spoke about the need to overcome the tendency to go on autopilot mode. In contrast, others were transparent about their struggles to unlearn due to experiencing differing levels of fear, hesitation, and anxiety when intentionally choosing to do something different. To successfully unlearn, individuals need a degree of open-mindedness, a willingness to change, and a desire to seek continual improvement.[22] The challenge, however, is that these attitudes all require stepping out of the comfort zone that we, as humans, often prefer to live in.[4,8] One way to become more comfortable with being uncomfortable is shifting from a fixed mindset to a growth mindset.[23,24]

The benefits and importance of fostering growth mindsets apply to different contexts and disciplines. This is no exception for athletic training professionals, clinicians, and educators alike. A growth mindset frees individuals of fears and failures because

every action and resulting outcome, even an unfavorable one, is viewed as a learning opportunity[23] and a chance to become better personally and professionally. Unlearning involves trying something new, challenging the status quo,[4] and being a direct promoter of change. Thus, unlearning may be more easily achieved by individuals with growth versus fixed mindsets. An AT approaching the unlearning process with a fixed mindset may consider it impossible, too uncertain, too risky, or all of the above (ie, focus on the outcome and potential for failure), whereas an AT approaching the unlearning process with a growth mindset may instead see change as an opportunity to improve their practice and subsequently patient care (ie, focus on the process or progress).

Developing a growth mindset takes time but may be more easily achieved in a team-based environment. Participants discussed the role of mentors, peers, and friends as facilitators of unlearning. Specifically, the ability to brainstorm and problem solve as well as share ideas with one another was viewed as favorable and beneficial by some, while others identified a desire for these collaborative interactions. Though none of our participants made a direct reference to communities of practice, they described precisely that when speaking about the positive influence of a shared space to learn with and from one another. Communities of practice are "groups of people who share a concern, a set of problems, or a passion about a topic and who deepen their knowledge and expertise in this area by interacting on an ongoing basis… These people don't necessarily work together every day, but they meet because they find value in their interactions… They explore ideas and act as sounding boards."[25(p4-5)] Researchers have demonstrated varied aims of communities of practice in health care, from knowledge exchange to clinical practice improvement and implementation of EBP.[26] Communities of learning and practice have specifically been highlighted as facilitators of unlearning.[4,27] Within athletic training, communities of practice may be beneficial in developing positive attitudes toward the unlearning process; keeping up with the evolving evidence base; identifying what skills, techniques, or procedures can be unlearned and why; and brainstorming how to turn intentions into action in clinical practice, all within a judgment-free space. Routinely engaging in a collaborative learning environment, like a community of practice, may help to facilitate intentional unlearning (ie, directed unlearning) and hopefully prevent unlearning from occurring in unexpected, uncontrolled, sometimes painful ways, or all of the above (ie, deep unlearning).[4]

Resources to Support Unlearning

Participants frequently referenced types of resources that would help assist ATs through the unlearning process. Traditionally, original research publications and other passive dissemination methods are often used to communicate new knowledge.[17] However, resources in this format do not succinctly articulate critical steps for implementing the new knowledge into practice[17] and often hide behind a paywall, inaccessible to the target audience. Participants' reflections on barriers to and facilitators of unlearning largely revolved around resources and evidence, including types, availability, and the inability to keep up with available evidence. The role of evidence in promoting unlearning has been highlighted previously in a group of physicians.[18] According to Gupta et al,[18] the quality of evidence supporting guidelines and recommendations was a key factor in physicians' decisions to unlearn. These perspectives highlight the need for consumable education on the evolving evidence base, including the quality of such evidence, targeted to relevant stakeholders. However, to truly appreciate what consumable education consists of, we must first understand the types of resources that help ATs identify concepts to unlearn and how these resources should be disseminated.

Based on our findings, some ATs were not sure what should be unlearned in their practice and, as a result, suggested identifying an avenue from which this information could be communicated. As materials are developed and disseminated by knowledge producers to share discoveries,[17] a concerted effort should also indicate what existing knowledge the new knowledge may replace. For example, consensus and position statements that outline best practice recommendations should emphasize techniques and procedures that are no longer supported and reference applicable research as it becomes available. For knowledge consumers who may not be able to access such resources, information regarding outdated knowledge or skills should also be disseminated on open platforms (eg, social media). Sharing information this way can be more accessible, affordable, and digestible than information published in peer-reviewed journals. Without clearly articulating outdated knowledge or skills, ATs are left with the burden of navigating the plethora of research publications produced at an alarmingly fast rate to determine which information is relevant to their clinical practice or patient population.[17] As proposed by Welch Bacon et al,[17] the use of knowledge translation models may serve as a beneficial starting point to facilitate unlearning as a part of the EBP process.

Limitations and Future Directions

With the use of survey-based methodology, an inherent risk of self-selection bias exists. Individuals who participated may have had a general interest in the topic of unlearning regardless of their experiences going through the process of unlearning in practice. Due to our recruitment strategy, we caution extrapolation of our findings to all ATs since non-NATA members were not represented in this study. Opportunities for future research in this area are widespread, but the participants' experiences highlighted a few key unanswered questions. While the survey-based approach gave us insight into barriers to and facilitators of unlearning for ATs, a more in-depth investigation is needed to determine how information can be better disseminated to promote the unlearning process. Further exploration of this topic will contribute to the body of knowledge by identifying what knowledge producers can do to promote unlearning across the profession and what knowledge consumers can do to encourage unlearning in their own practice. Additionally, while we can understand and appreciate the role of unlearning to enhance clinical practice, it is unclear what this process looks like for professionals in the field of athletic training. Understanding the steps taken within an athletic training context will provide valuable insights on ways to overcome well-known barriers and promote the unlearning process at the professional level.

CONCLUSIONS

Unlearning remains novel for the athletic training profession, though not a new concept. Despite many participants being not at all or minimally familiar with unlearning, those who had experience with the process could clearly articulate common barriers and strategies to promote unlearning in practice. Continued education on unlearning, including what techniques or skills should

be unlearned, why they should be unlearned, and how they should be unlearned, may better equip ATs to overcome habitual behaviors and fixed mindsets that often guide clinical decision-making processes. How this information is communicated should be easily digestible and accessible. Educational efforts should also be targeted toward other stakeholders (eg, coaches, parents, athletes or patients) whose values and expectations sometimes do not align with the care ATs provide. The individual best suited to fulfill the role of educator in this instance is the AT. As part of the care process, ATs educate the patient and other relevant stakeholders on medical decisions made and the reason for them while also giving the patient a voice in the process. When care deviates from what a patient would consider normal or standard (eg, ice for an acute injury), providing a rationale for the change in practice can allow patients and other stakeholders to understand and accept it more easily. While unlearning can be challenging since it involves a behavior change, we as a profession should work together to normalize the process in educational and clinical practice to continually advance patient care delivery.

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