

BUILDING THE FUTURE TOGETHER – INTEGRATING PRACTICE AND SCIENCE IN TACTICAL PERFORMANCE

INTRODUCTION

The tactical strength and conditioning (TSAC) community has become an increasingly visible part of the broader strength and conditioning profession, reflected by a dedicated NSCA Professional Development Group, a Tactical Strength and Conditioning Facilitator® (TSAC-F®) credentialing pathway, and expanding employment opportunities across military, law enforcement, fire, and public safety settings. The purpose of this article is to describe how practice and science can be integrated in TSAC through four areas: (a) collaborations between scientists and coaches, (b) career pathways and expectations, (c) scientific advances and translational models, and (d) mentorship and branding for the next generation of TSAC professionals.

SECTION I — FOUNDATIONS OF TSAC COLLABORATION

Historically, training and performance approaches in TSAC sectors leaned heavily on tradition rather than empirical data. This experiential knowledge remains valuable, as practitioners are frequently the first to observe emerging trends and performance adaptations in the field. However, a persistent divide between researchers and practitioners has limited the translation of scientific evidence into application (7,49).

Recently, that landscape has shifted. Programs such as the United States Army's Holistic Health and Fitness (H2F) program and the expansion of human performance through Preservation of the Force and Family (POTFF) have demonstrated the impact of integrating scientists directly into operational environments (i.e., an “embedded model”). These teams now work side by side with operators using evidence-based strategies that improve readiness, resilience, and recovery (46). Yet, some tactical sectors, such as law enforcement and firefighters still lag, mostly due to funding and policy challenges.

Laboratory protocols, though vital for control and precision, often lack ecological validity when applied to tactical populations (9). Conversely, field-based approaches are rich in realism but plagued by uncontrolled variables (13). Meaningful progress occurs from balancing these two approaches, using laboratory precision to guide fieldwork and grounding research questions in the lived experiences of practitioners. Ultimately, bridging the gap between the scientists and the practitioner builds a more impactful performance ecosystem. When both collaborate, the value of science is measured not by publications or citations, but by tangible gains in health and human performance (14,27,42).

SECTION II — INSIGHTS FROM PRACTITIONERS THE PRACTITIONER'S PATH: BUILDING A CAREER IN TACTICAL STRENGTH AND CONDITIONING

A career in TSAC begins by identifying the professional path that best aligns with one's long-term goals. Professionals working in this field merge advanced education with specialized credentials and practical experience to design performance and injury-prevention programs for tactical populations. Each credential often brings special qualifications that augment traditional strength and conditioning expertise, enabling them to provide added services or better understand certain populations. Although TSAC practitioners in all settings are similarly charged with enhancing readiness and reducing injuries, specific duties and career paths depend on the operational environment, practitioner qualifications, and regulatory considerations.

Military settings utilize practitioners as commissioned officers or civilian contractors. Commissioned officers advance through traditional military promotion structures and command hierarchies, while civilian contractors typically progress through contract renewals, expanded scopes of work, or transitions to larger installations or higher leadership levels, and can transition to permanent or temporary government employees in some cases. Municipal services in fire, police, or emergency management may offer either permanent positions integrated into department structure or contracted arrangements based on budget availability. Permanent positions often provide more stability and benefits, while contracted roles may offer flexibility but require continuous demonstration of value. Advancement for civilian practitioners commonly occurs through department or district transfers and moves to larger agencies.

Building strong relationships with leadership is essential for meeting both short- and long-term success in the tactical field. Successful practitioners maintain regular communication with stakeholders to ensure mission objectives and budgetary limitations are understood while also continuously reinforcing their value to the organization.

Practitioners who demonstrate adaptability by anticipating evolving demands and providing data-driven solutions build credibility while supporting future TSAC funding and expansion. For example, a coach hired at a Marine Corps air station to support a single aviation squadron may begin by working with leadership to identify operational challenges, injury trends, and training constraints. Programs are then designed around mission

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cycles and personnel availability, with outcomes tracked using performance-relevant metrics such as injury rates, lost duty days, and overall readiness. Over time, these documented results provide leadership with clear evidence of program effectiveness, supporting broader adoption across the air wing and investment in permanent TSAC positions.

Career growth within TSAC is often driven by the ability to meet both client and organizational needs. Early-career practitioners often start by serving small populations and gradually progress into roles such as program manager, director of human performance, or agency-wide TSAC coordinator. These professionals may be involved in influencing decisions regarding funding priorities or policy decisions across agencies at higher levels of federal, state, or departments within an agency. The evolution of the TSAC profession gives opportunities for growth, leadership, and innovation to those professionals who combine technical expertise with strategic vision.

Continued professional development is important throughout one's career. Engagement with professional organizations, attendance at industry conferences, and pursuit of continuing education opportunities help practitioners stay current with evolving best practices and expand their professional networks. These connections often lead to new opportunities and collaborative problem-solving when facing common challenges such as budget cuts, leadership turnover, or organizational resistance to change. Ultimately, the evolution of the TSAC profession offers opportunities for leadership and innovation to those professionals who combine technical expertise with strategic vision and a commitment to serving those who serve others.

OPERATIONAL EXPECTATIONS AND PROFESSIONALISM

Professionalism within the TSAC profession is mission-aligned, evidence-driven, and grounded in the unique demands of tactical work. Professionalism for TSAC practitioners requires a balance of foundational scientific knowledge, operational awareness, ethical judgment, and the interpersonal skills to collaborate across multidisciplinary teams. A practitioner's professionalism must be grounded in ethical behavior, including working within their scope of practice, ensuring athlete safety, understanding risk profiles, maintaining confidentiality, and aligning all programming with unit-specific mission demands.

TSAC practitioners should have a strong foundation of scientific knowledge (e.g., exercise physiology, biomechanics, and motor control) to effectively understand how tactical athletes adapt to both acute and chronic training. When designing programs, practitioners must integrate multiple performance domains (e.g., strength, endurance, and mobility) with occupational demands. Understanding the physical demands of job tasks (e.g., load carriage, equipment manipulation, intensity level, work to rest ratios, etc.) is the minimum standard; professionals should also

understand how environmental factors may increase the physical and mental stress faced by tactical athletes. Environmental factors commonly experienced by tactical athletes include heat stress, cold stress, altitude, sleep loss/shift work (3,16,41,56,63). Additionally, the personal protective equipment (PPE) used by tactical athletes may cause additional physiological or biomechanical burden (11,47).

An often-overlooked aspect for TSAC professionals is medical and physical screening within tactical settings, including the identification of musculoskeletal injury (MSKI) risk. Furthermore, tactical populations have a high prevalence of cardiometabolic risk factors including hypertension (54,59,62), diabetes/pre-diabetes (8,12), obesity (40), and metabolic syndrome (4), as well as elevated rates of MSKI due to repetitive load carriage, high training volumes, and occupational task demands (33,45,48). TSAC professionals play an important role in monitoring training sessions and conducting evidence-based fitness screenings prior to the start of exercise programming. Adherence to safety protocols including occupational heat protocols (1), hydration strategies (2), and appropriate work-rest cycles (39,52) is essential to maintain safety. Furthermore, TSAC professionals should maintain clear emergency action plans for all training environments, ensuring the safety and readiness of tactical athletes remains the priority of every session.

TSAC professionals must also demonstrate strong interpersonal skills to effectively communicate with a variety of stakeholders. Clear verbal and written communication—including coaching cues, documentation, and leadership briefings—is essential. TSAC professionals frequently work alongside physical therapists, athletic trainers, occupational therapists, dietitians, and other specialists, requiring a shared decision-making framework and respect for professional scope of practice. Knowing when to refer athletes for medical care or specialized support is fundamental to ethical and effective practice. Furthermore, TSAC professionals should remain flexible and adaptable, as tactical environments often require rapid program adjustments due to time constraints, resource limitations, or leadership changes.

PRACTITIONER PERSPECTIVE: A VOICE FROM THE FIELD

Entering the TSAC field can be an exciting and rewarding pathway for the experienced strength and conditioning professional. One of the earliest and most important considerations is identifying the specific tactical population of interest and specialization within the military, law enforcement, fire, or public safety arena, as each carries distinct qualification expectations and cultural demands. While minimum requirements typically include a relevant bachelor's degree, National Strength and Conditioning Association (NSCA) certification, and experience, successful candidates often distinguish themselves through internships, cross-disciplinary training, and a demonstrated ability to adapt across environments.

Career pathways into TSAC are rarely linear. Reflecting upon our experiences, there were several elements that aligned years later. For example, one author of this article started undergraduate work, was an athlete, and was in Army Reserve Officers' Training Corps (ROTC) but after two years took a break for military service. They had a platoon sergeant interested in incorporating more relevant training concepts as they prepared to deploy to Iraq very early into the Global War on Terror, which provided an opportunity for practical application. It also served as an early exposure to the concept of training for the unknown, balancing physical traits such as power and endurance, and thinking outside the box, which is a consistent theme throughout most TSAC professionals' careers. Upon returning to formal education, the absence of an established strength and conditioning program led them to pursue additional training in athletic training alongside an exercise science major. Gaining experience in injury assessment, rehabilitation support, and athlete communication proved invaluable. These experiences distinguished them during interviews for professional baseball positions by demonstrating the ability to operate effectively in dynamic, high-demand environments and by providing a foundational sports medicine background that complemented the role of the athletic trainer. They subsequently worked in the collegiate environment for a year, followed by two years in professional baseball where they obtained prerequisites for many emerging TSAC positions in 2011 (e.g., leadership and communication skills, team building, and programming for large teams with minimal time). The combination of prior military service and coaching experience across collegiate and professional athletics was instrumental in securing a government position.

A key lesson learned from experiences is working in a tactical setting requires flexibility. Although culture is positively shifting to allow service members devoted time for human performance training, the mission will always take precedence. TSAC practitioners must adapt to shifting schedules, competing priorities, and evolving leadership expectations while still delivering meaningful outcomes. The ability to remain adaptable, mission-focused, and solutions-oriented is often what sustains long-term success and credibility in the field.

SECTION III — INSIGHTS FROM SCIENTISTS

Scientists work across military research laboratories, universities, and private sector positions. Success requires building relationships with operational communities, communicating in a shared language, and publishing for both academic and practitioner audiences. Pragmatic field studies addressing operational questions often matter more than controlled laboratory studies. The most effective models are practitioner-informed and evidence-based, ensuring that scientific inquiry remains grounded in operational realities and directly serves those it is intended to support.

TRANSLATION: LAB TO FIELD

Research has established critical key performance indicators and evidence-based interventions across all three domains. For example, wearable sensors reveal that tactical mobility tasks place greater demands on personnel than steady-state load carriage, with demands particularly elevated in female service members (15). For every one-kilogram increase in lean muscle mass, a soldier's chances of completing a 19.31-km march on time increased by 24% (57). Musculoskeletal injuries account for over two-thirds of soldier injuries and result in millions of limited-duty days annually (25,32), with firefighter injury rates exceeding the private sector by over three times (20).

Soldiers, firefighters, and law enforcement officers experience high rates of sprains, strains, overuse injuries, and load-related pain due to heavy gear, repetitive tasks, awkward lifting, and unpredictable environments (34,43,45). Because TSAC practitioners play a major role in injury prevention and return-to-duty conditioning, understanding MSKI mechanisms and evidence-based rehabilitation strategies is essential to maintaining readiness across the force.

Cognitive performance research reveals that vigilance, reaction time, and working memory decline after just hours of sustained operations (60). When cognitive demands are layered onto physical tasks, performance deteriorates further; for example, significantly impairing shooting accuracy and movement efficiency (10). However, service members with higher aerobic fitness and greater psychological resilience demonstrate better capacity to maintain tactical decision making under stressful conditions (58). Mental health research shows firefighters experience post-traumatic stress disorder (PTSD) rates around 8 – 18%, with rates increasing linearly with cumulative trauma exposure (24,44). These findings underscore the importance of evidence-based approaches to training, injury prevention, cognitive resilience, and mental health support.

EMERGING SCIENCE AND FUTURE DIRECTIONS

TSAC professionals should be aware of current and emerging trends to be successful in their roles. The field is rapidly advancing through technological innovation and data-driven methodologies that revolutionize personnel readiness optimization, which include sleep, nutrition, supplements, biomarkers, and wearable technology.

Sleep is an important modifiable risk factor for performance and recovery. Extending sleep duration produces immediate benefits in psychomotor vigilance, executive function, and physical performance, while “banking sleep” improves alertness during subsequent sleep deprivation (51,53). For anticipated night operations, planned sleep-wake shifting, or “reverse-cycle” scheduling, may also be useful, although daytime sleep is often

difficult to obtain and may require deliberate fatigue-management strategies such as gradual schedule shifts (22). Understanding and optimizing sleep represents one of the most accessible yet powerful levers for enhancing performance across all domains.

Nutrition and supplements are another area that could benefit the tactical field. For example, creatine monohydrate supplementation can improve anaerobic exercise capacity, muscular fitness, thermoregulation, decision making, sleep, and recovery from traumatic brain injuries (21). Other supplements, such as caffeine, whey protein, beta-alanine, and nitrates have shown benefits in tactical populations (23,26,30,35,36).

Biomarkers are an emerging, yet complex field (31). Specifically, salivary biomarkers demonstrate potential for non-invasive, field-deployable assessments (5,29). For example, recent work has identified the potential for fatigue and sleep deprivation to be measured via saliva (37,38). In the future, a shift toward precision approaches may allow practitioners to tailor interventions to individual responses rather than relying solely on one-size-fits-all programming.

Artificial intelligence (AI) and machine-learning approaches may help TSAC professionals integrate data (e.g., wearables, biomarkers, electronic health records, etc.) to identify emerging risk profiles. In military populations, machine-learning models have already been used to stratify service members by MSKI risk, and multifactorial risk models have identified physical, psychological, nutritional, and sleep-related factors associated with injury during Army Basic Combat Training (6,19). Related work using passive physiological and smartwatch data also suggests potential for identifying PTSD-related hyperarousal or PTSD risk signatures, although these approaches require further validation before operational implementation (55). As these tools mature, moving from reactive to predictive approaches could dramatically reduce injuries and optimize readiness across entire units. AI could act as force multiplier for TSAC professionals, as it allows to more efficiently support for tactical athletes in settings where the TSAC professional to tactical athletes ratios could be very low. However, AI should support, not replace, professional judgment and appropriate medical or leadership decision making.

As these technologies mature and integrate into daily operations, the tactical athlete of the future will benefit from truly individualized, evidence-based support that enhances both immediate mission effectiveness and long-term health outcomes.

BRIDGING THE GAP: FROM LAB TO LINE

Advancing tactical athlete health and performance requires an understanding of how science evolves from foundational discoveries to real-world application. This process is often described as the translational research continuum, sometimes referred to as “bench to battlefield” in tactical settings (28).

Initially basic research may explore fundamental biological, psychological, or biomechanical mechanisms that underpin human performance. These insights then move into applied research, where potential interventions are tested in controlled environments such as labs. The next phase, implementation, evaluates those strategies in human populations to assess their safety, effectiveness, and operational relevance. Several implementation science frameworks have been developed to help ensure that scientific findings translate into real-world impact and should be considered alongside the translational research continuum (17,18,27,50).

The Army's H2F program and Air Force's Comprehensive Readiness for Aircrew Flying Training (CRAFT) exemplify practitioner-scientist partnerships, placing multi-disciplinary teams of strength coaches, physical therapists, dietitians, mental health professionals, and performance scientists directly within operational units. These embedded wellness programs allow continuous monitoring with real-time intervention. This integration ensures research directly addresses real-world challenges and solutions can be implemented immediately where they matter most.

At the core of many implementation science frameworks is a shared principle of meaningful collaboration between scientists and practitioners. One approach that embodies this collaboration, and has been successful with tactical populations, is community-based participatory research (CBPR). CBPR is a model that in tactical settings engages tactical athletes as equal partners alongside scientists and organizational leadership (61). Rather than research being done on the tactical athlete population, CBPR emphasizes research done with the tactical athlete population, focusing on priorities identified by those in the field. This model encourages joint involvement across all stages of the research process, from defining relevant questions and designing protocols to collecting and interpreting data and ultimately applying findings to improve operational outcomes.

A step further from CBPR is embedded research where scientists work directly within operational settings, such as units, departments, or training commands, to co-develop and test solutions. This close collaboration fosters two-way communication characterized by tactical organizations (e.g., military branches, fire departments, etc.) shaping the research agenda based on real-world demands, while scientists generate findings that inform operational decision making. Such integration is especially valuable in environments where mission demands, and environmental stressors cannot be simulated in traditional laboratory settings.

Ultimately, addressing the complex health and performance challenges of tactical athlete populations requires interdisciplinary collaboration between scientists, practitioners, and organizational

leadership (41). Importantly, strength and conditioning is foundational to tactical athlete readiness by enhancing performance, reducing injury risk, and promoting long-term health and career longevity. Positioned at the intersection of research, training, and real-world application, the TSAC professional can serve as a bridge between scientists, unit leaders, and tactical athletes. By aligning scientific research with operational realities, the TSAC professional plays a critical role in “bridging the gap” between basic science to effective, scalable solutions that drive changes resulting in population level impact.

SECTION IV — COLLABORATION, MENTORSHIP, AND COMMUNITY COLLABORATION

Collaboration is a two-way street. Practitioners benefit when scientists translate their findings into actionable insights, while scientists can gain feedback on application constraints from practitioners. The most impactful exchanges tend to occur through ongoing relationships or work-embedded collaborations rather than isolated interactions at conferences or meetings, with practitioners often preferring direct interaction to written guidance for implementing new ideas quickly and scientists preferring methods that help them quantify data or ask new questions. This suggests case reports on tactical athletes, shared training or field data on units, and long-term studies could allow both sides to iterate and learn quickly.

One practical approach to fostering this collaboration is through joint pilot programs. For example, a practitioner and scientist may co-design a short training block to compare two evidence-informed approaches while holding key variables constant. Shared dashboards, check-ins, and brief case discussions allow both parties to assess feasibility, athlete response, and performance trends, while producing outputs that inform both operational decision making and future research directions. These small-scale pilots provide a low-burden mechanism for rapid learning and collaboration.

MENTORSHIP

Mentorship has deep roots in strength and conditioning and is essential for building the TSAC community. For students, this commonly includes an internship with a professional, collegiate, or private strength and conditioning program. Because TSAC is a newer subspecialty, many students seek mentors without a clear pathway. While no formal NSCA TSAC mentoring program exists at present, recent NSCA mentorship efforts provide workable templates that can be adapted to tactical contexts.

In TSAC settings, mentorship accelerates competence and connects students to the operational culture they will serve. It can be paid or unpaid, but on military installations mentors should plan for a longer onboarding phase to meet security, access,

and information-protection requirements. Effective programs could mirror core elements of the tactical structure, so mentees learn how to operate within unit governance: chain of command, standardized communication, a somewhat predictable battle rhythm, and after-action reviews. Career guidance should also be included in a mentorship. Mentors should help students align certifications and degrees with job targets, shape a plan that builds around marketable skills, and connect them with as many professional contacts as they can to help build their career. By the end of a mentor program, mentees should feel comfortable in the environment and confident in their technical skills.

One mentorship model could provide a semester-based “crawl-walk-run” progression to build TSAC student capabilities. Skills, stakeholder interaction, and leadership responsibilities increase each term while safety, standards, and weekly touchpoints are constant. In the crawl phase, students complete onboarding in safety, confidentiality, and data ethics while developing a small set of core competencies linked to tangible outputs, such as a needs analysis and or a focused training method. They may assist with basic monitoring (e.g., rate of perceived exertion [RPE] and wellness check-ins), observe advanced testing, and support validation of a workflow. The phase concludes with a short needs analysis and a practitioner-ready protocol that includes coaching cues and contingency options.

During the walk phase, students take on increased responsibility by implementing standardized testing protocols, co-leading training sessions, and managing a simple weekly dashboard for stakeholders. Periodic reviews guide program adjustments, and students may mentor junior interns to reinforce standards. Deliverables could include an executive brief linking the intervention to readiness or injury risk and clear documentation that supports replication and continuity.

In the run phase, students lead a sustainable initiative that extends beyond the semester; coordinate regularly with coaching, medical, and research personnel; and incorporate individualized progressions when appropriate. Final outputs include decision frameworks, standardized dashboards, after-action reviews, and practitioner-ready briefs, with the goal of adoption into routine practice supported by a defined sustainability plan.

BUILDING A STRONG TSAC BRAND

Currently, more than 1,000 individuals hold the TSAC-F certification, spanning professional strength and conditioning coaches, service members, and first responders. This growing community exemplifies how science and service intersect to enhance mission readiness and human performance across tactical environments.

The tactical sector continues to mature both professionally and economically. According to the 2025 NSCA Salary Survey, the average annual income for TSAC professionals approaches \$83,000 to \$85,000, with seasoned experts exceeding \$95,000 depending on years of service and region. States with established military and government installations, such as Colorado, New Mexico, and Virginia, report the strongest compensation trends. These data points reflect the increasing institutional value placed on integrated human performance programs and evidence-based readiness initiatives.

Collaboration is a cornerstone of the TSAC-F brand. The NSCA's tactical community advances through shared outputs such as peer-reviewed publications, a professional conference, a dedicated Professional Development Group, and collaborations with the Department of War. These efforts highlight the unique value of science and practice integration, showcasing how interdisciplinary teams of strength coaches, exercise scientists, and tactical leaders, can create scalable and data-informed solutions that improve performance and resilience in the field. The long-term vision for the TSAC-F brand centers on sustainable leadership. Every certified TSAC-F, regardless of setting, contributes to this mission by mentoring and elevating the standard of care for tactical athletes.

CONCLUSION

The TSAC community advances when the people who study it and the people who live it work together. Practitioners bring operational insight, access, and real-world evidence, while scientists bring methods, measurements, and scientific writing that gets pushed to the broader community. Aligning these strengths creates programs that earn trust from leadership and deliver results for everyone. The next steps are clear: grow together through mentorship and collaboration, publish together to document what works and why, and lead together by setting credible, implementable standards for the field.

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