

Current Clinical Concepts: A Framework for Concussion Management Strategies in Law Enforcement Officers

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Athletic trainers are increasingly used in nontraditional settings, such as in law enforcement, where they can contribute to health-care management, including concussion management of law enforcement officers (LEOs). Despite the prevalence of concussions among LEOs, there is a notable gap in concussion management guidelines for this population. LEOs may lack the education and resources necessary for concussion recognition and proper management. Drawing on advancements in concussion management in athletes and military personnel, here, we present a comprehensive framework for concussion management in LEOs encompassing concussion education, a graduated return-to-duty

protocol, and considerations for implementation and documentation specific to law enforcement. We also present several barriers and facilitators to implementation. Due to job requirements, it is critical for law enforcement organizations and their medical providers to adopt a concussion management strategy. Without proper concussion management, LEOs may risk subsequent injury and/or suffer from prolonged recovery and adverse long-term outcomes.

Key Words: traumatic brain injury, tactical athletes, police, return to duty, light duty

Key Points

- Law enforcement officers have unique job requirements (eg, high-speed driving, marksmanship, stress, critical decision-making, and irregular sleep/shift work) that may complicate concussion management.
- Law enforcement organizations should adopt a graduated return-to-duty protocol for law enforcement officers with a concussion.

Athletic trainers (ATs) are increasingly working in emerging settings, such as public safety (eg, law enforcement), military, and occupational health.¹ In these settings, ATs can offer injury education, assessment and diagnosis, and therapeutic intervention. Law enforcement organizations often hire ATs to reduce medical costs associated with musculoskeletal injuries common in law enforcement officers (LEOs), but organizations may also benefit from having ATs on-site to manage brain injuries, such as concussions. Like in a sporting context, ATs can provide concussion education, implement a return-to-duty (RTD) protocol, and maintain injury tracking and documentation. The purpose of this current clinical concepts article is to provide a comprehensive framework for ATs to contribute to concussion management for LEOs and to identify LEO-specific considerations for concussion management.

A concussion is a traumatic brain injury caused by a direct blow to the head or a hit to the body that transmits an impulsive force to the head.² Concussions can manifest with clinical

signs, such as loss of consciousness or posttraumatic amnesia, as well as a range of symptoms, such as physical, cognitive, emotional, and sleep-related disturbances.^{3–9} It is important to recognize that the presentation of signs and symptoms can vary among individuals, and not all cases exhibit the same pattern.⁶ In military personnel, returning to duty too soon after sustaining a concussion can lead to prolonged symptoms, decreased readiness, impaired marksmanship, musculoskeletal injuries, and elevated risk of subsequent concussions.^{10–21} Moreover, concussions can have long-term implications, including an association with poor mental health outcomes, such as posttraumatic stress disorder, depression, and alcohol abuse.^{22–28} Therefore, effective concussion management is crucial for optimizing both short- and long-term outcomes following such injuries.

Over the past 3 decades, significant progress has been made in understanding and managing sport-related concussions. In fact, all 50 states have enacted laws addressing sport-related concussion, which typically include mandatory concussion

education and protocols for removing athletes from play and clearing them to return to play.^{29,30} Further, the US Department of Defense has mandated a progressive RTD protocol following acute concussion, which has resulted in lower symptom levels (indicating better outcomes) at 1 week, 1 month, and 3 months than observed in those who did not follow such a protocol.¹⁰ However, similar concussion education and RTD protocols are often not available in most occupational contexts, such as among civilian LEOs.

Approximately 60% of police officers reported a history of concussions, with nearly 30% of those injuries occurring on duty.³¹ The most common mechanisms of injury were falls, motor vehicle accidents, altercations, being shaken or shot, and proximity to blasts or explosions.³¹ Notably, 40% of police officers who had experienced a concussion reported persisting symptoms, whereas only 8–15% of collegiate athletes with sport-related concussions experience persisting symptoms or delayed return to play, highlighting the opportunity to improve concussion management in this population.^{31,32} Although there are existing recommendations for concussion management in athletes and military personnel, there are no guidelines regarding concussion management specific to LEOs. The comparison between LEOs and military personnel is often made in research, but factors such as access to medical care and tempo of training and operations are very different and require careful consideration in the context of concussion management. Therefore, here, we provide a framework for concussion management in LEOs, including concussion education and a concussion RTD protocol, with special considerations for implementation and documentation.

CONCUSSION EDUCATION

The first step in concussion management is concussion education. Research examining different athletic and military populations suggests that not knowing their head injury was a concussion or not thinking it was serious enough are among the top reasons for not seeking appropriate care.^{33–37} As in these other populations, LEOs may not seek appropriate care without awareness of the signs and symptoms of concussion and their potential consequences. Concussion education should start in the training academy, which often involves defensive tactics training with the potential for concussion.³⁸ Many LEOs also undergo an annual in-service training, which may provide a venue for continued concussion education. Because there may be a reluctance to report concussions, concussion education should focus on the importance of immediate reporting and removal from duty by stressing the potentially negative outcomes associated with delayed reporting and removal from duty. For example, research in athletes indicates that delayed concussion reporting leads to longer recovery times and increased symptoms.³⁹

Concussion education should extend beyond LEOs themselves to other stakeholders, such as supervisors, on-site medical providers (eg, physicians, emergency medical technicians), and medical providers affiliated with the Bureau of Workers' Compensation, who may be responsible for concussion recognition and removal from duty in LEOs. Beyond recognizing signs and symptoms of concussion, this training could also include how to initiate a concussion RTD protocol and best practices for recovery, LEO-specific safety concerns, such as driving at high speeds and weapons fire, and the potential for persisting symptoms and prolonged recovery if appropriate

management is not initiated. All stakeholders should document their concussion education and training through an annual acknowledgement, similar to the requirements for athletes, parents, and coaches in many sporting organizations. Finally, it is important to make educational resources for both LEOs and other stakeholders available in an easily accessible location. Possible solutions include an organization's intranet or mobile applications (eg, custom or commercial smartphone applications), where LEOs can easily reference them when needed.

ESTABLISHING A CONCUSSION RTD PROTOCOL

Despite a robust body of literature suggesting better concussion outcomes following a graduated return to activity protocol in athletes and military personnel, to our knowledge, few law enforcement organizations have established concussion RTD protocols.^{10,11,40,41} Implementing such a protocol in this population may be highly important due to job requirements, including high-speed driving, marksmanship, stress, critical decision-making, and irregular sleep/shift work. Here, we propose a graduated concussion RTD protocol for LEOs (Table). Although this framework is flexible enough to fit the needs of various roles (eg, SWAT, patrol, and criminal) and law enforcement organizations (eg, sheriff's office, police department), it may require careful consideration for how to implement based on the specific needs of each role/organization.

The protocol, based on the US Department of Defense's concussion RTD protocol with modifications based on the most recent Consensus Statement on Concussion in Sport, consists of 6 stages, progressing from relative rest to full duty.^{2,42} Each step of the protocol should allow for a minimum of 24 hours, and if symptoms worsen, LEOs should return to the previous stage. At stage 3, LEOs may transition to return to work with symptom-based work limitations (eg, light duties). Although there is insufficient evidence to make recommendations for a particular timeframe from concussion to return to driving, LEOs should abstain from any type of driving until dizziness or visual symptoms have resolved.^{43–47} Additionally, because a robust body of literature suggests that sleep disturbances and clinical sleep and circadian disorders are common after concussion and lead to worse outcomes, alternating shift work or shifts exceeding 8 hours could worsen symptoms or impede recovery and should be avoided.⁴⁸ Further, activities that may lead to additional head impacts or injuries (eg, defensive tactics training, weapons fire) may also worsen symptoms or impede recovery and should be avoided until LEOs can undergo an RTD screening with a medical provider. Consistent with recommendations by the Concussion in Sport Group, when concussion-related symptoms persist for more than 2 to 4 weeks after injury, LEOs should be referred to a medical provider with expertise in concussion management.^{2,49,50} These medical providers can recommend targeted treatment for specific symptoms (eg, vestibular therapy for persisting dizziness, vision training for persisting visual symptoms).

CONSIDERATIONS FOR IMPLEMENTING AN RTD PROTOCOL

Implementing a concussion RTD protocol within a law enforcement organization will require the support of multiple key individuals (eg, sheriff or chief) and groups (eg, unions, human resources, legal department). When beginning the process of establishing an RTD protocol, clear goals must be

Table. Concussion Return-to-Duty Recommendations for Law Enforcement Officers (LEOs)

Graduated Concussion Return-to-Duty Protocol ^a	
Stage	Activity
Stage 1: Relative rest	Light physical and leisure activities that do not make symptoms worse; no work, no exercise or physical training, no weapons fire, no driving
Stage 2: Symptom-limited activity	Increase physical and cognitive activities that do not provoke symptoms (eg, take a walk, light reading/computer work as tolerated); no work, no resistance or defensive tactics training or weapons fire, no driving until dizziness or visual symptoms have resolved
Stage 3: Light activity (LEO can return to work at this stage with symptom-based limitations)	Increase physical activity (eg, longer walk, elliptical, or stationary bike) and work with symptom-based limitations; no alternating shift work or shifts exceeding 8 hours, no resistance or defensive tactics training or weapons fire
Stage 4: Moderate activity	Increase physical activity (eg, running, resistance training as tolerated) and work-related duties (eg, technical reading, computer work, clean weapons); no alternating shift work or shifts exceeding 8 hours, no defensive tactics training or weapons fire
Stage 5: Intensive activity (LEO can undergo return-to-duty screening with a medical provider)	Participate in normal training activities within a supervised environment; no alternating shift work or shifts exceeding 8 hours
Stage 6: Return to full duty	Unrestricted activity

^a Each step of the protocol should allow for a minimum of 24 hours. If symptoms worsen, LEOs should return to the previous stage. If symptoms persist longer than 2 weeks, LEOs should be referred to a medical provider for additional concussion management.

outlined. These goals should be presented in a multifaceted way that addresses the needs and concerns of LEOs in various roles. For example, an LEO on patrol may be more interested in faster symptom reduction, whereas a state commission member may be more interested in a reduction of potential accidents. Mandating a concussion RTD protocol may also be met with resistance by the unions; however, unions should consider advocating for change in this area to protect the health of officers. Identifying specific interests of different law enforcement groups requires open and transparent dialogs at every career stage and experience level. Goal setting and process evaluation can be more precise if an implementation team is formed of motivated individuals with experience in different stakeholder groups. The implementation team will play a pivotal role in establishing the requisite trust between LEOs and any RTD protocol efforts.

In implementing a concussion RTD protocol, determining the roles and responsibilities of stakeholders will be crucial.³⁰ Regarding removal from duty, LEOs can either self-report symptoms to supervisors or supervisors can recognize signs and symptoms in their LEOs and take them off duty. If available, on-site medical providers (eg, at jails) or emergency medical technicians (eg, at the scene of motor vehicle accidents) can also assist in identifying concussion signs and symptoms and removing LEOs with suspected concussions from duty. Without on-site medical care, such as ATs, LEOs themselves may need to implement the concussion RTD protocol, which would require additional tools and training. Organizations or medical providers can offer suggested physical activities and light duties for each stage to facilitate this process. Whenever feasible, law enforcement organizations should provide on-site access to medical providers with experience and expertise in concussion management and RTD progressions, such as ATs, to reduce medical costs and enhance injury recovery.⁵¹ For full RTD, LEOs should obtain medical clearance from a physician or other licensed medical provider. Lastly, evaluating the impact of implementing a concussion RTD protocol is important.³⁰ Collaborating with researchers can enable law enforcement organizations to test and refine their concussion RTD protocol and prove efficacy in LEOs as done previously by the Department of Defense.¹⁰

Documentation of the concussion or potentially concussive event will be crucial for Bureau of Workers' Compensation

reimbursements. At a minimum, the documentation should include a description of the event, any alteration of consciousness or memory, and the presenting symptoms. Organizations can refer to The American Congress of Rehabilitation Medicine diagnostic criteria for mild traumatic brain injury to obtain detailed information about potential mechanisms of injury, clinical signs and symptoms, and findings from clinical examinations.⁵²

DISCUSSION

Here, we present a framework for concussion management in LEOs, including concussion education and RTD protocol implementation. Implementing an athlete-healthcare model for LEOs and other public safety personnel in various injury management contexts stands the potential to enhance their performance and health throughout their careers and lifetime, which will improve retention rates and extend career longevity. It is evident that LEOs often experience inadequate or delayed access to medical care, resulting in prolonged recovery and unfavorable long-term outcomes. By raising awareness and advocating for initiatives, such as on-site ATs, we may be able to mitigate the serious long-term consequences of injury for these individuals. As alluded to throughout this clinical commentary, having an AT on-site offers numerous advantages for law enforcement organizations. ATs have expertise in injury risk reduction, rehabilitation, and return-to-play/activity protocols, allowing them to provide education and immediate care and management of injuries, including concussions, ultimately reducing recovery times and improving outcomes.

It is important to note that the proposed protocol will require careful consideration for how to implement based on the specific needs of each role/organization. For example, organizations must consider how to implement work limitations based on symptoms, such as what light duties are feasible as LEOs transition to return to work, and how to facilitate training activities within a supervised environment, such as training on driving courses and in shooting simulators. Law enforcement organizations will also need to consider how to schedule RTD evaluations promptly and establish a referral process for cases requiring additional concussion management. When available, ATs can assist in concussion management planning and implementation.

The primary focus of this clinical commentary was to provide a comprehensive framework for ATs to contribute to concussion management in LEOs and to identify LEO-specific considerations for concussion management. Although this is a first step in improving concussion management in LEOs, there is much room for future research. For example, we must assess the impact of implementing a concussion RTD protocol. This evaluation can be conducted using quantitative data, which includes analyzing the number of concussions and recurrent concussions, measuring time loss and medical costs, tracking symptoms and other health outcomes, identifying complications arising from unreported or undiagnosed concussions, and assessing knowledge, attitudes, or behaviors surrounding concussions. Correct expectations must be set about the result of a successful implementation. There is the potential that implementing an RTD protocol will increase the number of concussions detected because of increased reporting. This possibility must be clearly articulated to law enforcement organizations before the collection of any concussion metrics. The purpose of an RTD protocol is to improve the overall health of LEOs after a concussion. Clearly articulating this goal and vision to all LEOs within an agency is important to successful implementation.

Additionally, qualitative data gathered through interviews and focus groups can provide valuable insights into the experiences of LEOs with concussions before and after concussion RTD protocol implementation. We also need additional data on the value of baseline data in this population and specific protocols for return to driving and return to shooting. To address these important questions, researchers must work collaboratively with law enforcement organizations to advance the field of concussion management for LEOs and enhance their overall well-being.

CONCLUSIONS

Concussions can significantly impact LEO performance and well-being. Implementing a concussion RTD protocol, like those used in sporting and military contexts, may aid LEOs in achieving a faster recovery and a safer RTD. We have proposed such a protocol, but it is important to adapt it to the specific requirements of different law enforcement roles and organizations and to test its effectiveness during implementation. The fundamental principles of current concussion management involve promptly removing individuals from activity upon suspicion of a concussion and obtaining medical clearance from a physician or other licensed medical provider before resuming activity. Comprehensive concussion education and training for all stakeholders is crucial in recognizing, diagnosing, and managing concussions effectively. We strongly believe that implementing a concussion RTD protocol, along with a comprehensive education and training plan, will facilitate quicker recovery, yield better short- and long-term outcomes, and ultimately improve readiness and career longevity for LEOs.

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REFERENCES

1. Radzak KN, Sedory EJ, Hooper M, Kasamatsu TM. Defining athletic training in the military setting: a survey investigation into professional characteristics, preparation, and barriers in clinical practice. *J Athl Train*. 2020;55(5):522–531. doi:10.4085/1062-6050-213-19
2. Patricios JS, Schneider KJ, Dvorak J, et al. Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport—Amsterdam, October 2022. *Br J Sports Med*. 2023;57(11):695–711. doi:10.1136/bjsports-2023-106898
3. Echemendia RJ, Brett BL, Broglio S, et al. Introducing the sport concussion assessment tool 6 (SCAT6). *Br J Sports Med*. 2023;57(11):619–621. doi:10.1136/bjsports-2023-106849
4. Gardner AJ, Howell DR, Levi CR, Iverson GL. Evidence of concussion signs in national rugby league match play: a video review and validation study. *Sports Med Open*. 2017;3(1):29. doi:10.1186/s40798-017-0097-9
5. Elbin RJ, Zuckerman SL, Sills AK, Crandall JR, Lessley DJ, Solomon GS. Sensitivity and specificity of on-field visible signs of concussion in the National Football League. *Neurosurgery*. 2020;87(3):530–537. doi:10.1093/neuros/nyaa072
6. Caccese JB, Garcia G-GP, Kontos AP, et al; CARE Consortium Investigators. Test–retest reliability and efficacy of individual symptoms in concussion management. *Clin J Sport Med*. 2023;33(1):52–60. doi:10.1097/JSM.0000000000001084
7. Brett BL, Kramer MD, McCrea MA, et al. Bifactor model of the sport concussion assessment tool symptom checklist: replication and invariance across time in the CARE consortium sample. *Am J Sports Med*. 2020;48(11):2783–2795. doi:10.1177/0363546520946056
8. Nolan KE, Caccese JB, Kontos AP, et al. Primary and secondary risk factors associated with concussion symptom clusters in collegiate athletes: results from the NCAA-DoD Grand Alliance CARE Consortium. *Orthop J Sports Med*. 2023;11(4):23259671231163581. doi:10.1177/23259671231163581
9. Caccese JB, Iverson GL, Hunzinger KJ, et al; CARE Consortium Investigators. Factors associated with symptom reporting in US service academy cadets and NCAA student-athletes without concussion: findings from the CARE Consortium. *Sports Med*. 2021;51(5):1087–1105. doi:10.1007/s40279-020-01415-4
10. Bailie JM, Remigio-Baker RA, Cole WR, et al. Use of the Progressive Return to Activity Guidelines may expedite symptom resolution after concussion for active duty military. *Am J Sports Med*. 2019;47(14):3505–3513. doi:10.1177/0363546519883259
11. Ettenhofer ML, Remigio-Baker RA, Bailie JM, Cole WR, Gregory E. Best practices for progressive return to activity after concussion: lessons learned from a prospective study of US military service members. *Neurotrauma Rep*. 2020;1(1):137–145. doi:10.1089/neur.2020.0023
12. Friedl KE, Grate SJ, Proctor SP, Ness JW, Lukey BJ, Kane RL. Army research needs for automated neuropsychological tests: monitoring soldier health and performance status. *Arch Clin Neuropsychol*. 2007;22 Suppl 1:S7–S14. doi:10.1016/j.acn.2006.10.002
13. Lesniak E, Ramsey KG, Brady C, Beydoun HA, Johnstone B. Predicting military readiness using objective and subjective indices of neuropsychological impairment in service members with mild traumatic brain injury. *Appl Neuropsychol Adult*. 2022;29(5):1152–1159. doi:10.1080/23279095.2020.1855588

14. Cecchini AS, Prim J, Zhang W, Harrison CH, McCulloch KL. The Portable Warrior Test of Tactical Agility: a novel functional assessment that discriminates service members diagnosed with concussion from controls. *Mil Med.* 2023;188(3–4):e703–e710. doi:10.1093/milmed/usab346
15. Kelley AM, Raney BM, Estrada A, Grandizio CM. Evaluation of the Military Functional Assessment Program: preliminary assessment of the construct validity using an archived database of clinical data. *J Head Trauma Rehabil.* 2015;30(4):E11–E20. doi:10.1097/HTR.0000000000000060
16. Grandizio C, Lawson B, King M, et al. *Development of a Fitness-For-Duty Assessment Battery for Recovering Dismounted Warriors.* US Army Aeromedical Research Laboratory; 2014.
17. Kelley AM, Britt TW, Lawson BD, Hayes A. Development and initial evaluation of a dynamic marksmanship battery: sensitivity to vestibular disturbances relevant to return-to-duty. *Mil Behav Health.* 2020;8(3):274–282. doi:10.1080/21635781.2020.1742822
18. Reneker JC, Babl R, Flowers MM. History of concussion and risk of subsequent injury in athletes and service members: a systematic review and meta-analysis. *Musculoskelet Sci Pract.* 2019;42:173–185. doi:10.1016/j.msksp.2019.04.004
19. Roach MH, Aderman MJ, Ross JD, et al. Risk of upper extremity musculoskeletal injury within the first year after a concussion. *Orthop J Sports Med.* 2023;11(5):23259671231163570. doi:10.1177/23259671231163570
20. Hunzinger KJ, Radzak KN, Costantini KM, Swanik CB, Buckley TA. Concussion history is associated with increased lower-extremity injury incidence in Reserve Officers' Training Corps cadets. *BMJ Mil Health.* 2023;169(2):112–115. doi:10.1136/bmjilitary-2020-001589
21. Remigio-Baker RA, Babakhanyan I, Gregory E, et al. Impact of prior brain injury on concussion recovery in military personnel: evaluation of timing between concussions. *J Head Trauma Rehabil.* 2021;36(6):456–465. doi:10.1097/HTR.0000000000000694
22. Bryant R. Post-traumatic stress disorder vs traumatic brain injury. *Dialogues Clin Neurosci.* 2011;13(3):251–262. doi:10.31887/DCNS.2011.13.2/rbryant
23. Bigler ED. Neuropsychology and clinical neuroscience of persistent post-concussive syndrome. *J Int Neuropsychol Soc.* 2008;14(1):1–22. doi:10.1017/S135561770808017X
24. Kaplan GB, Leite-Morris KA, Wang L, et al. Pathophysiological bases of comorbidity: traumatic brain injury and post-traumatic stress disorder. *J Neurotrauma.* 2018;35(2):210–225. doi:10.1089/neu.2016.4953
25. Kerr ZY, Evenson KR, Rosamond WD, Mihalik JP, Guskiewicz KM, Marshall SW. Association between concussion and mental health in former collegiate athletes. *Inj Epidemiol.* 2014;1(1):28. doi:10.1186/s40621-014-0028-x
26. Kerr ZY, Marshall SW, Harding HP Jr, Guskiewicz KM. Nine-year risk of depression diagnosis increases with increasing self-reported concussions in retired professional football players. *Am J Sports Med.* 2012;40(10):2206–2212. doi:10.1177/0363546512456193
27. Corrigan JD, Cole TB. Substance use disorders and clinical management of traumatic brain injury and posttraumatic stress disorder. *JAMA.* 2008;300(6):720–721. doi:10.1001/jama.300.6.720
28. Manley G, Gardner AJ, Schneider KJ, et al. A systematic review of potential long-term effects of sport-related concussion. *Br J Sports Med.* 2017;51(12):969–977. doi:10.1136/bjsports-2017-097791
29. Potteiger KL, Potteiger AJ, Pitney W, Wright PM. An examination of concussion legislation in the United States. *Internet J Allied Health Sci Pract.* 2018;16(2):6. doi:10.46743/1540-580X/2018.1712
30. Lowrey KM, Morain SR. State experiences implementing youth sports concussion laws: challenges, successes, and lessons for evaluating impact. *J Law Med Ethics.* 2014;42(3):290–296. doi:10.1111/jlme.12146
31. Smith NIJ, Gilmour S, Prescott-Mayling L, Hogarth L, Corrigan JD, Williams WH. A pilot study of brain injury in police officers: a source of mental health problems? *J Psychiatr Ment Health Nurs.* 2021;28(1):43–55. doi:10.1111/jpm.12676
32. Broglio SP, McAllister T, Katz BP, LaPradd M, Zhou W, McCrea MA; CARE Consortium Investigators. The natural history of sport-related concussion in collegiate athletes: findings from the NCAA-DoD CARE Consortium. *Sports Med.* 2022;52(2):403–415. doi:10.1007/s40279-021-01541-7
33. Anderson M, Petit KM, Wallace J, Covassin T, Beidler E. Factors associated with concussion nondisclosure in collegiate student-athletes. *J Athl Train.* 2021;56(2):157–163. doi:10.4085/1062-6050-0102-20
34. Rawlins MLW, Johnson BR, Register-Mihalik JK, DeAngelis K, Schmidt JD, D'Lauro CJ. United States Air Force Academy cadets' perceived costs of concussion disclosure. *Mil Med.* 2020;185(1–2):e269–e275. doi:10.1093/milmed/usz162
35. Beck C. *Factors Associated With Intention to Disclose Concussive Symptoms in Active Duty Soldiers.* Dissertation. Georgia Southern University; 2022.
36. Foster CA, D'Lauro C, Johnson BR. Pilots and athletes: different concerns, similar concussion non-disclosure. *PLoS One.* 2019;14(5):e0215030. doi:10.1371/journal.pone.0215030
37. Kerr ZY, Register-Mihalik JK, Kroshus E, Baugh CM, Marshall SW. Motivations associated with nondisclosure of self-reported concussions in former collegiate athletes. *Am J Sports Med.* 2016;44(1):220–225. doi:10.1177/0363546515612082
38. Smith CR, Onate JA, Edwards NA, et al. Characterizing head acceleration events in law enforcement cadets during subject control technique training. *Ann Biomed Eng.* 2024;52(10):2768–2779. doi:10.1007/s10439-023-03382-z
39. Barnhart M, Bay RC, Valovich McLeod TC. The influence of timing of reporting and clinic presentation on concussion recovery outcomes: a systematic review and meta-analysis. *Sports Med.* 2021;51:1491–1508. doi:10.1007/s40279-021-01444-7
40. Leddy JJ, Burma JS, Toomey CM, et al. Rest and exercise early after sport-related concussion: a systematic review and meta-analysis. *Br J Sports Med.* 2023;57(12):762–770. doi:10.1136/bjsports-2022-106676
41. Schneider KJ, Critchley ML, Anderson V, et al. Targeted interventions and their effect on recovery in children, adolescents and adults who have sustained a sport-related concussion: a systematic review. *Br J Sports Med.* 2023;57(12):771–779. doi:10.1136/bjsports-2022-106685
42. McCulloch KL, Goldman S, Lowe L, et al. Development of clinical recommendations for progressive return to activity after military mild traumatic brain injury: guidance for rehabilitation providers. *J Head Trauma Rehabil.* 2015;30(1):56–67. doi:10.1097/HTR.000000000000104
43. Dawson J, Johnston S, Marshall S, et al. Return to driving following concussion: a research priority. *J Head Trauma Rehabil.* 2023;38(3):277–278. doi:10.1097/HTR.0000000000000849
44. D'Silva L, Devos H, Hunt SL, Chen J, Smith D, Rippee MA. Concussion symptoms experienced during driving may influence driving habits. *Brain Inj.* 2021;35(1):59–64. doi:10.1080/02699052.2020.1857839
45. Schmidt JD, Hoffman NL, Ranchet M, et al. Driving after concussion: is it safe to drive after symptoms resolve? *J Neurotrauma.* 2017;34(8):1571–1578. doi:10.1089/neu.2016.4668
46. Lempke LB, Lynall RC, Hoffman NL, Devos H, Schmidt JD. Slowed driving-reaction time following concussion-symptom resolution. *J Sport Health Sci.* 2021;10(2):145–153. doi:10.1016/j.jshs.2020.09.005
47. Christensen J, McGrew CA. When is it safe to drive after mild traumatic brain injury/sports-related concussion? *Curr Sports Med Rep.* 2019;18(1):17–19. doi:10.1249/JSR.0000000000000558
48. Wickwire EM, Schnyer DM, Germain A, et al. Sleep, sleep disorders, and circadian health following mild traumatic brain injury in adults: review and research agenda. *J Neurotrauma.* 2018;35(22):2615–2631. doi:10.1089/neu.2017.5243
49. Broshek DK, Pardini JE, Herring SA. Persisting symptoms after concussion: time for a paradigm shift. *PM R.* 2022;14(12):1509–1513. doi:10.1002/pmrj.12884
50. Yeates KO, Räisänen AM, Premji Z, et al. What tests and measures accurately diagnose persisting post-concussive symptoms in children, adolescents and adults following sport-related concussion? A systematic

review. *Br J Sports Med*. 2023;57(12):780–788. doi:10.1136/bjsports-2022-106657

51. Burke NC. Reducing law enforcement medical costs: utilizing the sports medicine model. Fairfax County Police Department. Accessed May 5, 2023. <https://www.nata.org/sites/default/files/reducing-law-enforcement-medical-costs.pdf>

52. Silverberg ND, Iverson GL, Cogan A, et al; ACRM Brain Injury Special Interest Group Mild TBI Task Force members; ACRM Mild TBI Diagnostic Criteria Expert Consensus Group. The American Congress of Rehabilitation Medicine diagnostic criteria for mild traumatic brain injury. *Arch Phys Med Rehabil*. 2023;104(8):1343–1355. doi:10.1016/j.apmr.2023.03.036

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