

CAITLIN MCGEE, PT, DPT¹ • MATTHEW HWU, PT, DPT, OCS¹
 LESLIE L. NICHOLSON, PT, PhD² • KEVIN K.N. HO, PT, PhD^{1,3}

More Than a Game: Musculoskeletal Injuries and a Key Role for the Physical Therapist in Esports

Esports have surged in popularity over the past decade. In 2019, esports competitions garnered over 450 million viewers worldwide and upward of \$25 billion in revenue.¹ It is difficult to estimate the total number of professional competitors in esports, given debate around who is classified as a “professional competitor.” Yet thousands of competitors earn in excess of \$50 000 per year through their play.¹ Despite exponential growth in the esports industry, there is little knowledge of physical health demands on competitors and subsequent implications for managing injuries. Competitors seek health care from a variety of professionals, often with limited success and sometimes resulting in early retirement.^{2,6} Reviews have suggested ways to improve the health and performance of esports competitors,^{3,4} but esports injuries remain poorly understood and insufficiently researched.⁷

It is reasonable to ask, “Are esports really sports?” and “Are esports competitors really athletes?” In traditional sports, players experiencing injury receive treatment plans and return-to-play protocols that accurately address their ability to continue competing. Athleticism (or lack thereof) should not be a defining requirement for appropriate interventions to support esports competitors, as this population has unique performance and injury-related requirements owing to the physical and

cognitive demands of this competitive activity.

In this editorial, we highlight the role of physical therapy in esports, the need for best-practice guidelines for musculoskeletal health care in esports, and specific targets for future esports research.

A Role for the Physical Therapist in Esports

Esports require repetitive fine motor movements of the upper extremity for consecutive hours, while maintaining stable static seated postures. Professionals perform 10 movements per second (500-600 actions per minute), and regularly practice esports-related skills for 5 to 10 hours per day.^{3,8} Esports load is nearly triple the 8000 to 11000 key-strokes (130-180 actions per minute) of office workers, who are at increased risk of upper extremity pain.¹⁰ Esports “seasons” vary, depending on the game and the type of competitive structure (eg, multiple stand-alone tournaments versus league structure). A typical season involves weekly competition, multiple days of training matches with other competitive teams, and individual practice focused on mechanical or technical skills.

There are currently limited data and relatively few practitioners with experience in the esports field, making it diffi-

● **SYNOPSIS:** The esports industry is growing exponentially: more viewers, more support, more money, and more players. Esports competitors require high-level cognitive function and dexterity. There is an increasing demand for physical therapists to manage esports-related musculoskeletal injuries across all levels of play (amateur, semi-professional, professional). Clinicians have relied on general musculoskeletal principles and extrapolating research findings from other populations, including athletes, office workers, air traffic controllers, and musicians, to inform an evidence-based practice approach to assessing and manag-

ing injury in esports competitors. The physical demands of esports competitors are triple those of office workers, varying across esports games, platforms (computer, console, mobile), and levels of performance. We highlight the role of physical therapy in esports, the need for best-practice guidelines for musculoskeletal health care, the current research evidence, and the large research gaps in the field. *J Orthop Sports Phys Ther* 2021;51(9):415-417. doi:10.2519/jospt.2021.0109

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¹IHP, Los Angeles, CA. ²School of Medical Sciences, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia. ³Sydney School of Health Sciences, Faculty of Medicine and Health, The University of Sydney, Camperdown, Australia. ORCID: Ho, <https://orcid.org/0000-0003-2438-3467>. The authors certify that they have no affiliations with or financial involvement in any organization or entity with a direct financial interest in the subject matter or materials discussed in the article. Address correspondence to Dr Kevin Kwan Ngai Ho, Discipline of Physiotherapy, Level 7, D18 Susan Wakil Health Building, Western Avenue, The University of Sydney, Camperdown, NSW 2006 Australia. E-mail: kevin.ho@sydney.edu.au ● Copyright ©2021 JOSPT®, Inc

cult to know what evidence-based health care in esports is. One can draw on data from analogous populations, including research in traditional sports, air traffic controllers, musicians, office workers, and third-shift workers (TABLE). However, the demands on anatomical structures, and consequently on competitors, vary between gaming platforms, input devices, play styles, and games (commonly referred to as “esports titles”). Examples of potential pathologies at different joints, as well as ergonomic factors affecting loads at these joints, are shown

TABLE	ANALOGOUS POPULATIONS AND THEIR CHARACTERISTICS THAT MAY BE EXTRAPOLATED TO ESPORTS
Analogous Population	Characteristics to Extrapolate Esports
Traditional sports	Load management, return to play, emotional/stress regulation, effects of travel on performance
Air traffic controllers	Cognition, dexterity, digital interface
Musicians	Cognition, dexterity, emotional/stress regulation
Office workers	Ergonomics, static postures
Third-shift workers	Impact of irregular sleeping patterns



1. Cervicothoracic
 - a. Cervical pain
 - b. Cervicogenic headache
 - c. Cervical radiculopathies
 - d. Thoracic pain
 - e. Upper crossed syndrome
 - f. Thoracic outlet syndrome
2. Shoulder complex
 - a. Scapular dyskinesia
 - b. Impingement syndrome
3. Elbow/forearm
 - a. Epicondylopathy
 - b. Cubital tunnel syndrome
 - c. Hand/wrist muscle overuse
 - d. Olecranon bursitis
4. Wrist
 - a. Tendinopathies
 - b. Compressive nerve injuries
 - c. Triangular fibrocartilage complex degeneration
5. Finger
 - a. Tendinopathies
 - b. Osteoarthritis
6. Ergonomic factors
 - a. Monitor height/distance
 - b. Keyboard/mouse position
 - c. Armrest use
 - d. Backrest use
7. Keyboard biomechanics
 - a. Wrist flexion/extension
 - b. Wrist radial/ulnar deviation
8. Mouse biomechanics
 - a. Grip style
 - b. Wrist flexion/extension
 - c. Wrist radial/ulnar deviation

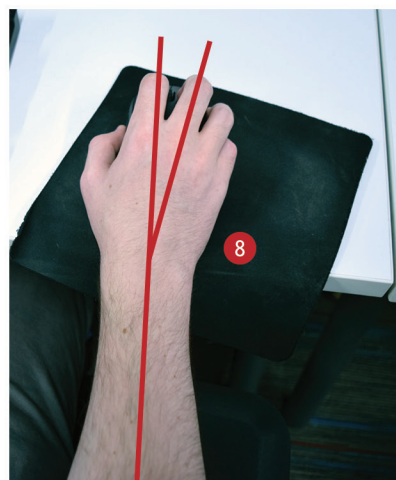


FIGURE. Potential musculoskeletal pathologies and ergonomic factors in esports.

in the **FIGURE**. Not all esports use a mouse and keyboard as input devices (ie, controller, mobile phone), as office workers might—the demands and requirements within esports are unique compared to other professions with which esports is often associated.

Preliminary research has evaluated the overall physical activity levels of competitive gamers, but relatively limited data exist on injury prevalence in competitive gamers. Two studies of competitors playing 3 to 10 hours a day reported a high frequency of pain patterns, similar to those of sedentary office personnel: 31% to 41% reported back or neck pain, 6% to 36% reported wrist pain, and 5% to 30% reported hand pain.^{3,9} However, it is unclear what might explain these pain patterns in esports.

Call to Action: More Research, Please

More prevalence data, especially longitudinal data on specific musculoskeletal conditions across esports games and across levels of performance, are needed. It is also crucial to understand the physical demands of gaming, in particular the ways in which different gaming input devices, game types, and play styles affect the loads placed on musculoskeletal structures. Similar to traditional sports, we expect there to be differences between professional esports competitors—with their periodized training schedules, access to team resources, and season-based play—and amateur competitors.⁵ Accordingly, esports teams would most likely benefit from a similar organized multidisciplinary health care model. Physical therapists are well positioned to act as primary care providers in such a model to address concerns related to overall physical activity levels, injury prevention, injury management, and competitive performance.

At present, clinical management of esports injuries relies primarily on musculoskeletal first principles of assessment

and treatment. For example, an esports competitor who presents with de Quervain tenosynovitis may benefit from a physical load management approach, but which task-specific activities should be temporarily suspended, and which adjustments to the peripherals (eg, desk, chair, mouse, or keyboard) will alleviate pain and/or facilitate faster return to esports? Is de Quervain tenosynovitis a common injury sustained by personal computer esports competitors? How common is it? Does it occur more often in personal computer esports competitors of a particular game? Are professional competitors as likely to develop it as non-competitive players? What ergonomic, posture, and game-play factors elevate or decrease the risk of de Quervain tenosynovitis? Currently, there is insufficient research to provide clinically meaningful answers to these questions.

Summary

The esports industry is growing exponentially, with more viewers, more support, more money, and more players. Physical therapists are well positioned to design and carry out research to establish best practices for the esports population. Esports research should also move toward prospective longitudinal studies that explore injury prevention and treatment strategies for competitors. Avenues for funding may include high-revenue esports organizations (eg, Epic Games) that have a vested interest in their competitors' health. As esports research grows, the opportunity to develop clinical practice guidelines will undoubtedly follow. ●

STUDY DETAILS

AUTHOR CONTRIBUTIONS: All authors contributed to the conception and design of the study, drafted the editorial or revised it critically for important intellectual content, and gave final approval of the version to be submitted.

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