

Esports-Related Wrist and Finger Injuries and Prevention Strategies

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Abstract

The rapid rise of competitive video gaming, or esports, has highlighted concerns about health risks associated with extended, high-intensity digital engagement. Esports athletes often perform repetitive fine-motor movements with their wrists, hands, and fingers, increasing their risk of musculoskeletal disorders (MSDs) such as carpal tunnel syndrome, tendinopathies, gamer's thumb, and mouse elbow. My project investigates the frequency, causes, and prevention strategies for wrist and finger injuries among esports players, with an emphasis on specific physical exercise programs and design. Literature from sports medicine, ergonomics, and physical therapy is reviewed. Results show that injury rates among esports athletes vary from 30% to over 60%, with the wrist being the most frequently affected area. The main risk factors include gaming for more than 5 hours daily, extended practice sessions, insufficient rest, and poor workstation ergonomics. Prevention strategies include primary interventions like ergonomic gaming mouse with adjustable DPI, modular parts, and neutral wrist positions. They also involve secondary measures such as warm-up routines, neuromuscular strengthening exercises, and scheduled micro-breaks based on the 20-20-20 visual rule. Evidence supports a multidisciplinary approach involving physical therapists, ergonomists, and performance coaches to enhance athletes' longevity and competitive results. This project concludes that proactive injury prevention, which involves integrated ergonomic improvements and targeted exercise routines, is vital for maintaining esports participation at both amateur and professional levels.

Keywords

Esports, Gaming Mouse, Ergonomic Design, Physical Exercise, Musculoskeletal Health

1. Introduction

Electronic sports (esports) are a quickly growing global phenomenon, with competitive video gaming hosting professional leagues, the Esports World Cup, large prize pools, and millions of viewers worldwide. The esports industry has developed into a multi-billion-dollar powerhouse. By 2026, the market is expected to reach over \$5 billion in revenue, with more than 670 million viewers globally. The landscape is propelled by popular titles like League of Legends, Counter-Strike 2, and Mobile Legends: Bang Bang (Esports Charts, 2026). Esports is a rapidly growing global trend, featuring professional leagues, large prize pools, and millions of viewers (Stoll 2026). As participation increases—especially among adolescents and young adults—there are rising concerns about the physical health impacts of long hours of intense digital commitment. Unlike traditional sports, where athletes risk physical injuries, esports players mainly face overuse injuries caused by repetitive fine-motor movements under ongoing mental stress (Sant and Stafrace 2021). The upper extremity, especially the wrist, hand, and fingers, endures the highest biomechanical load during esports. Quickly clicking a mouse, tapping the keyboard, handling controllers, and maintaining static postures lead to microtrauma in tendons, nerves, and joints over time (Greiner et al. 2019). If not properly managed, these stressors can result in serious conditions that affect performance, force players to take breaks, or even cut careers short (McGee et al. 2021).

This project fills a significant gap in esports health research by reviewing existing evidence on wrist and finger injury causes and assessing two prevention approaches: (1) ergonomic improvements to equipment and workstations and (2) organized exercise and movement strategies.

2. Background

Today's esports athletes usually train 6–10 hours daily, executing thousands of repetitive hand and wrist motions each session (Kari et al. 2021). Different popular games like League of Legends (MOBA), Counter-Strike (FPS), and Fortnite (Battle Royale) demand specific motor skills: precise mouse aiming, quick keyboard actions, or intricate controller maneuvers (Stoll 2026). These genre-specific requirements lead to unique biomechanical stress patterns that influence injury risks.

Musculoskeletal injuries (Sant and Stafrace 2021) are prevalent among esports players, with 42% experiencing neck and back pain. Wrist and hand pain are reported in 36% and 30% of players, respectively (DiFrancisco-Donoghue 2019), with some sources indicating that hand and wrist issues affect over 60% of esports athletes (Noon 2019). Most upper-limb injuries in this group stem from overuse. These repetitive strain injuries, such as Carpal Tunnel Syndrome, Mouse Elbow, Gamer's Thumb, and shoulder tendinopathies, are depicted in Figure 1 from Sant and Stafrace's research.

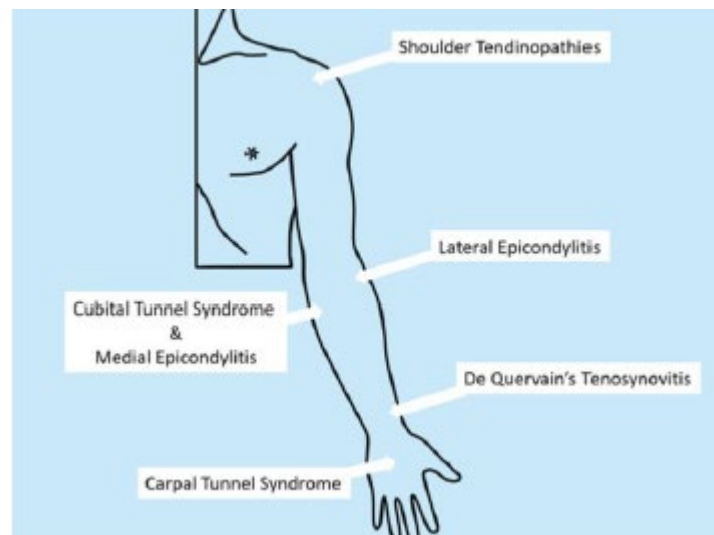


Figure 1. Common musculoskeletal injuries found in esports players (Sant and Stafrace 2021).

- **Carpal Tunnel Syndrome (CTS)** is the most common peripheral nerve entrapment in the upper limb. It results from compression of the median nerve in the carpal tunnel, often due to repetitive wrist movements like flexion, extension, and sustained gripping. Symptoms such as tingling, numbness, and reduced grip strength can significantly impair players who need quick reactions. Research indicates that over 60% of gamers experience CTS symptoms, with more than half showing functional impairments (Zain et al. 2014).
- **Mouse Elbow**, also known as "Lateral Epicondylitis", is a tendinosis affecting the common extensor origin at the lateral elbow (Esportshealthcare.com-a). It worsens with repetitive wrist extension and forearm pronation during mouse use (Walker-Bone et al. 2012). Several prominent esports professionals have had to retire early due to this condition (McGee et al. 2021).
- **Gamer's Thumb**, also known as "De Quervain's Tenosynovitis", is a common condition resulting from repetitive thumb use (Esportshealthcare.com-b). It involves inflammation of the abductor pollicis longus and extensor pollicis brevis tendons, often worsened by repetitive thumb motions on controllers or mouse side-buttons (Sant and Stafrace 2021).
- **Tendinopathies** of the wrist and finger flexors and extensors result from chronic overload that exceeds the tissues' capacity to recover, leading to pain, swelling, and decreased dexterity (Greiner et al. 2019).

Proper ergonomic design of equipment is essential for reducing injuries. Gaming mouse differ from regular peripherals in several important aspects: they feature higher-DPI sensors for precise cursor control with less hand movement; programmable buttons that lessen the need to use the keyboard; customizable weight systems for personalized balance; and ergonomically contoured shapes that support neutral wrist posture (GeeksforGeeks 2025). Vertical or angled mouse can also decrease forearm pronation, alleviating strain on wrist extensor muscles (Zafs et al. 2024). However, incorrect setup—such as setting DPI too high, leading to overshooting, or too low, causing the user to move their arm more—can increase injury risk even with advanced equipment (Dupuy 2023).

Although esports-related MSDs are increasingly acknowledged, substantial obstacles still exist in preventing and managing these injuries.

1. Many gamers postpone seeking medical assistance for developing symptoms, frequently playing through pain until their condition becomes considerably worse (McGee et al. 2021).
2. Competitive incentives promote over-practicing without adequate rest, undermining key principles of tissue adaptation and recovery (Kari et al. 2021).
3. Many players are unaware of correct workstation setup, ideal mouse sensitivity, or the significance of tailoring equipment to their individual body measurements (Staff 2016).
4. Injury development results from complex interactions between biomechanical load, psychological stress, sleep quality, nutrition, and pre-existing conditions, making isolated interventions challenging (DiFrancisco-Donoghue 2019).

Tackling these challenges calls for a structured, evidence-based framework that combines equipment design, behavior change, and clinical treatment.

3. Methods

This project uses a narrative review to summarize existing research on wrist and finger injuries in esports and on prevention strategies. Sources were selected through targeted searches of academic databases and trusted industry publications.

4. Data Collection

Data extraction focused on injury prevalence, biomechanical risk factors, ergonomic guidelines, and exercise routines.

5. Results and Discussion

Recent epidemiological research highlights the significant burden of upper-limb MSDs among esports players. In a study of 365 Brazilian esports athletes, 30.96% experienced time-loss injuries over the past year, with 28.49% of injuries occurring in the wrist (Anselmo-e-Silva et al. 2026). Multivariate analysis pointed to practice duration and weekly gaming hours as key factors linked to wrist injuries. Likewise, research on wrist and hand function decline emphasizes the widespread nature of gaming-related strain (Anggaraini and Rahman 2025).

Key risk factors are listed below:

1. Daily gaming duration: Playing games for more than 5–6 hours daily without scheduled breaks can lead to greater muscular fatigue and a higher risk of injury (Kari et al. 2021).
2. Static Body Posture: Holding a static posture, such as sitting for long periods with a forward head position, raised shoulders, and ulnar-deviated wrists, reduces tissue blood flow and speeds up the buildup of microtrauma (Staff 2016).
3. Insufficient recovery—stemming from inadequate sleep, poor nutrition, and missing active recovery strategies—impairs the body's tissue repair process (DiFrancisco-Donoghue 2019).
4. Suboptimal equipment settings: An excessively high mouse DPI can lead to tremors and overshooting errors, whereas a low DPI necessitates larger arm movements that may fatigue shoulder stabilizers (Dupuy 2023).

5.1 Prevention Strategy I: Ergonomic Design Optimization

Mouse Selection and Configuration:

- Select gaming mouse that feature adjustable DPI settings, with a recommended range of 800–1600 for most FPS and MOBA games, to optimize both precision and ease of movement (Dupuy 2023).
- Focus on models featuring modular components such as interchangeable side grips and adjustable palm rests to better suit individual hand shapes (GeeksforGeeks 2025).
- Think about using vertical or angled layouts to maintain the forearm in a neutral position, which helps lower the strain on the extensor tendons (Zafs et al. 2024).
- Customize software to assign common in-game actions to mouse buttons, reducing the need to reach for the keyboard and lowering shoulder elevation.

Workstation Setup Principles:

- Place the monitor so it is at eye level and 20–30 inches away to avoid neck flexion and reduce upper trapezius tension (Staff 2016).
- Set the chair height so your elbows are at a 90–110° angle, with forearms parallel to the floor. Use armrests to support your elbows without lifting your shoulders.
- Keep a neutral wrist position when using a mouse; wrist rests should support the palm without compressing the carpal tunnel.
- Add sit-stand desk options to allow users to switch postures and lessen static stress on the spine and upper limbs.

5.2 Prevention Strategy II: Exercise and Movement Interventions

Pre-Session Warm-Up Protocol: A 10-minute dynamic routine helps prepare tissues for gaming demands.

1. Perform 10 wrist circles in each direction to boost synovial fluid flow.
2. Finger extensions involve resistive band exercises that target the extensor digitorum, helping to balance flexor dominance.
3. Perform 15 scapular retractions to engage your postural stabilizers and help correct forward shoulder posture.
4. Gently perform chin tucks and lateral flexions to maintain neck mobility.

In-Session Micro-Breaks: Schedule regular micro-breaks, pausing gameplay every 60–90 minutes for 6 minutes of:

1. Standing and walking to improve circulation in the lower limbs.
2. Wrist flexor and extensor stretch (hold each for 30 seconds)
3. Diaphragmatic breathing to decrease sympathetic arousal and relax muscle guarding.
4. Perform a visual reset by following the 20-20-20 rule: every 20 minutes, look at an object 20 feet away for 20 seconds (DiFrancisco-Donoghue 2019).

Post-Session Recovery Exercises

1. Eccentric wrist curls: Perform 3 sets of 15 reps using a light dumbbell to encourage tendon remodeling.
2. Grip strengthening involves squeezing therapy putty or a soft ball in 3 sets of 20 reps to enhance the endurance of intrinsic hand muscles.
3. Thoracic extension mobilizations: Foam roller exercises designed to combat the effects of extended sitting.

Multidisciplinary care integration is essential for effective injury prevention, relying on collaboration among all stakeholders.

- Physical therapists perform biomechanical evaluations, design personalized exercise plans, and deliver manual therapy to address early symptoms (McGee et al. 2021).
- Ergonomists assess workstation configurations and suggest equipment adjustments using anthropometric data (Staff 2016).
- Performance coaches incorporate physical conditioning into training plans and track load management to avoid overtraining (Kari et al. 2021).
- Medical professionals, including those at the Cleveland Clinic's Esports Medicine Program, combine sports medicine, chiropractic care, vision therapy, and mental skills training to meet the comprehensive needs of competitive gamers (Cleveland Clinic 2024).

6. Conclusion

Esports-related wrist and finger injuries pose a significant yet preventable issue in the fast-changing world of competitive gaming. Research shows that up to a third of esports athletes experience injuries that cause time away from play each year, with the wrist being the most frequently affected area (Anselmo-e-Silva et al. 2026). These

injuries result from various factors, including repeated biomechanical stress, poor ergonomics, high training volumes, and insufficient recovery methods. Effective prevention involves a dual-pathway strategy: (1) enhancing ergonomic design through smart equipment choices, workstation setup, and environment adjustments; and (2) adopting structured exercise routines that comprise warm-up activities, micro-breaks during sessions, recovery afterward, and ongoing conditioning. Importantly, these methods should be tailored to each person's body measurements, the specific demands of the game genre, and any history of injuries. For esports athletes, coaches, and healthcare providers, it's essential to prioritize wrist and finger health proactively. This approach not only prevents injuries but also boosts performance. Combining ergonomic understanding with movement science helps the esports community support long-term participation, prolong competitive careers, and raise professional standards in this evolving sport.

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Biography

Doruk Kasap is an 8th-grader at Beştepe College. He is currently preparing for the high school entrance exam in Türkiye. He is enthusiastic about video games, science, and mathematics, and placed 3rd in the *Eye Level Math Olympiad* in 2019. He plans to continue his career in either the life sciences or a STEM-related field.