ORIGINAL ARTICLE

MUSCULOSKELETAL DISORDERS IN COMPETITIVE VIDEO GAMING

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ABSTRACT

This paper reviews the rising growth of the esports industry and musculoskeletal disorders which are beginning to surface as more professional gamers train and practice to be the best in their field. To do this, various content from websites and esports reports was reviewed to identify the musculoskeletal disorders which are faced by esports professionals over various video game genres. This paper also outlines some ways forward for conducting research in the esports industry.

Keywords: eSports, competitive video gaming, musculoskeletal disorders

INTRODUCTION

Competitive video gaming has always been around since the arcade era in the 1980s with Atari's Space Invaders, but the true rise of competitive gaming or esports (electronic sports) as an industry we know today began in the late 2000s with games such as StarCraft and Counter-Strike (British Esports Association, 2016). This rise in competitive gaming was partly due to game developers who understood that it would had to rely on competitive gaming to create entertainment and passion in order to further expand the industry (Courrier, 2017).

This boom in competitive gaming was accelerated by the rise of digital streaming platforms such as twitch.tv which has been growing tremendously in terms of viewership (Popper, 2013) with 15,600,000,000 hours recorded total viewing hours for 2017 (ESC, 2018). Another factor which accelerated competitive gaming is the ever increasing prize pool for tournaments with cumulative prize pool for 2017 reaching a total of USD 113.18 Million, an increase of 14.22% since 2016 (E-sports Earning, 2018).

With the ever increasing number of professional video gamers (also known as esports professionals), there has been increase in numbers of people who report of musculoskeletal disorders due to excessive training for competitions such as carpal tunnel syndrome, stenosing tenosynovitis and lateral epicondylitis (Maiberg, 2015). This increase is not surprising as despite the vast knowledge of human factors and ergonomics (HFE) available, there has been relatively few studies made regarding the importance of the application of this science to competitive gaming as an industry (Martin Lujan, 2017).

OVERVIEW OF COMPETITIVE VIDEO GAMING

Esports (also known as electronic sports, e-sports, competitive (video) gaming, professional (video) gaming, or pro gaming) is a form of competitive video gaming which is played using a computer, video game consoles (such as PS4, Nintendo Switch and Xbox) or more recently, mobile phones.

There are various genres of esports which include the following:

Game Genre	Example of games
First Person Shooter (FPS)	Rainbow Six: Siege, Overwatch, Counter-Strike series, Halo series
Strategy	Starcraft II, Warcraft III, Pokémon VGC.
Role-Playing Game	World of Warcraft, Guild Wars 2, Blade & Soul
Digital-Collectible Card Games	Hearthstone, Gwent, Pokémon TCG, The Elder Scrolls: Legends
Fighting	Street Fighter, Super Smash Bros., Marvel vs. Capcom, BlazBlue series
Multiplayer Online Battle Arena (MOBA)	DotA 2, League of Legends, Heroes of the Storm, Arena of Valor
Sports	Fifa series, Madden, NBA 2k, Rocket League
Racing	Project CARS, iRacing, Need for Speed.
Puzzle Game	Pac-man, Catherine, Puyo Puyo Tetris

Figure 1: Types of Game Genres in Esports (Esports Earnings, 2018)

The video game industry has been in a steady increase over the recent few years with an increasing trend in total revenue generated from esports (refer to Figure 2) and prize

money offered out in esports events (refer to Figure 3).
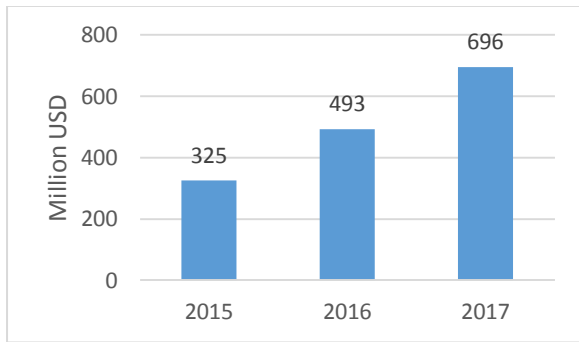

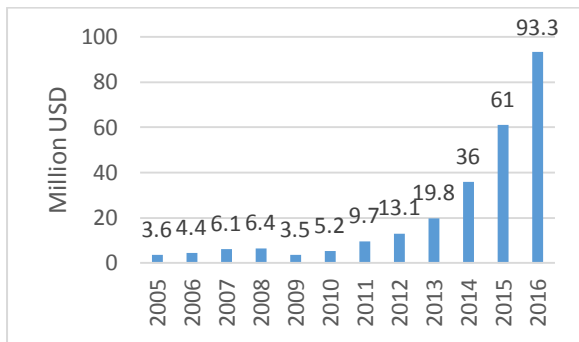Figure 2: Esports Total Revenue (Newzoo, 2017)

Figure 3: Esports Prize Money Development (Newzoo, 2017)

This increase in esports prize money is one of the factors which attracts a high number of people becoming interested to be an esports professional. In order to achieve this, they would have to train for long hours via computer or console to achieve their goals.

The impact of this increased prize money can be seen through figure 4 and figure 5, which shows the number of matches per day in the Electronic Sports League (ESL) and this data implies that there are a large amount of individuals sitting in sofas or chairs playing games with various types of computer set ups and console controllers training to become professionals.
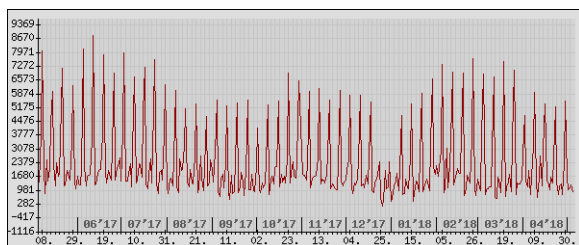

Figure 4: Matches per day in the Electronic Sports League (ESL, n.d.)

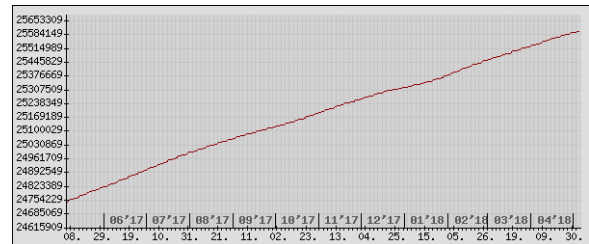Figure 4 quantifies the number of matches which have been played from May 2017 until April 2018.

Figure 5: Total matches in a year in the Electronic Sports League (ESL, n.d.)

Figure 5 shows the total number of matches which have been played from May 2017 until April 2018, which reaches about 25,584,150 matches in total.

Based on an analysis of 1000 DotA2 matches using data from datdota.com, on average, each game is approximately 37.60 minutes long with the longest game at 97.73 minutes and shortest game at 12.78 minutes. Each of these games consist of 10 players, with 5 players in each team competing to defeat the opposing team.

Which means that since May 2017 until April 2018, there have been 160,032,734 hours dedicated DotA 2 by players of the genre.

MUSCULOSKELETAL DISORDERS IN ESPORTS

Due to the growing number of players in the gaming industry, there has also been a rise of reports of musculoskeletal disorders among esports professionals. It can be seen that majority of the injuries which occur are musculoskeletal disorders which can arise from overtraining in preparation for a competitive game.

Figure 6 explores a list of injuries which are sustained by esports professionals. This list is just a sample of injuries which have been reported through the esports professional's social media platform, and through various news portals.

No.	Player Name	Age	Main eSport	Injuries
1	Hai	26	League of Legends	1. Wrist Injuries (2015) 2. Colapsed Lung (2014)
2	Hax	24	Super Smash Bros. Melee	1. Hand Injury (2015)
3	GuardiaN	27	CS:GO	1. CTS (2016)
4	olofmeister	26	CS:GO	2. CTS (2016)
5	Flash	26	Starcraft II	1. RSI related injury in wrist, forearm, shoulder (2011)
6	Mvp	27	Starcraft II	1. Wrist Injury, Spine and Neck issues (2012)
7	Fear	30	DotA 2	1. Elbow Injury - Tennis Elbow (2014)
8	Incontrol	33	Starcraft II	1. Blood Clot @ Knee (2013)
9	Janus	21	Overwatch	1. Collapsed Lung (2017)
10	gla1ve	23	CS:GO	1. Collapsed Lung (2016)
11	Mylon	22	League of Legends	1. Collapsed Lung (2015)
12	sC	23	Starcraft II	1. Wrist injury (n.d.)
13	Sheth	20	Starcraft II	1. Wrist pain (2011)
14	Scarlett	25	Starcraft II	1. Wrist injury (n.d.)
15	Ganzi	31	Starcraft II	1. Wrist injury (2013)
16	MiCKe	19	DotA 2	1. neurogenic thoracic outlet syndrom (NTOS) (2017)
17	Mithy	24	League of Legends	1. Wrist injury (2016)
18	Bjergsen	22	League of Legends	1. Wrist injury (2015)
19	Freeze	24	League of Legends	1. Tendonitis (2016)
20	Toyz	26	League of Legends	1. Wrist Injury

Figure 6: Injuries sustained by esports professionals

Injuries in esports is nothing new to the industry, every year there have been reports of players which are pulling out of events due to injuries. This usually caused by the extreme

level of training which the players go through in order to achieve their goals. Players on Team Liquid recently reported that they practice for a minimum of 50 hours per week and often play the game for far longer (Jacobs, 2015).

One of the most notable incidents include that of Clinton "Fear" Loomis, an American player who was widely regarded as one of the best DotA 2 players in North America. In March 2014 after the Monster Energy Invitational, Fear suffered from lateral epicondylitis caused by his excessive training and had to go on an extended hiatus from esports. Even after recovering, and later joining many competitions, he decided to retire from professional gaming in September 2016 due to health reasons (Evil Geniuses, 2016).

Injuries in the lower back have also been common in the industry. Sovann (2014), reported that one of the members of CompLexity Gaming, Andrew 'Bronze' Riser suffered from a back injury and had to be replaced. Esteban (2016) conducted a study on 93 gamers and came to a conclusion that back pain was the most common form of injury in esports. The main reason for this can be associated with players sitting for too long and the poor posture of esports players (Hwu, 2017).

Some esports professionals have been seen playing with awkward postures as shown in Figure 7 below.
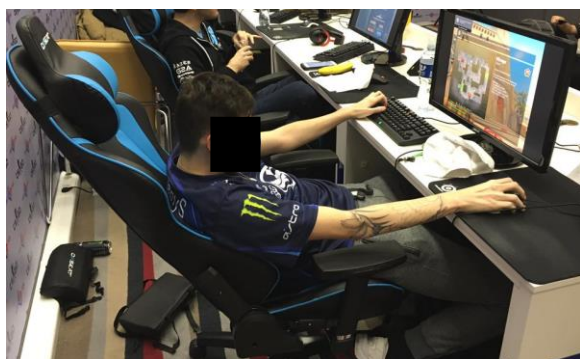

Figure 7: Example of awkward sitting posture in esports professionals.

STUDIES ON COMPETITIVE VIDEO GAME PROFESSIONALS

Despite the rising trends of esports related injuries, there are very little research which are aimed at the esports professionals and most of the research available are mainly aimed towards individuals which are playing the games as a hobby or casually. Due to differences between the casual players of video games and the actual professionals, the studies may be slightly misleading.

One such difference is the that real esports professionals or players who are going professional as play and practice very differently compared to the casual video gamer especially on the amount of time and effort spent on perfecting their skills on a game. As stated by Damon 'Karma' Barlow a professional Black Ops 3 player in an interview (Tamblyn, 2016):

"Sometimes we're up until 2am or it could be a 12 hour day, 14 hour day it all depends on what's going on. You're playing tournaments, practising and then if an event is coming up you're going to be practising even more, I would assume an athlete would do that as well though."

Research on this matter should be made by first identifying the best individuals for the study, which in this case are professional esports players or players who are trying to go professional and are practicing or playing as much as professional esports players.

The best way to recruit individuals which fit the descriptions mentioned above are players from esports teams and associations. A list of international esports teams can be found via the website 'www.esportsearnings.com/teams' which have a list of top ranking teams in esports based on the amount of prize money which they obtained.

In Malaysia, Persatuan Sukan Elektronik Malaysia or eSports Malaysia (eSM) is the governing body for electronic sports in the country and it is also registered under the Malaysian Sports Commission. Similar associations can be found on an international scale, for instance, the Korea e-Sports Association (KeSPA), British eSports Association and the World eSports Association (WESA), these associations govern the esports and competitive video gaming scene in their respective areas.

Close collaboration should be made between competitive teams, esports associations and researchers to build upon existing research and further the field in eSports. This will yield more accurate and meaningful results which can be used to protect and improve the lives of esports professionals around the world.

CONCLUSION

As the competitive video gaming industry begins to develop and advance, there will also be an increase in musculoskeletal disorders which will develop from training and practicing on video games. It is crucial that competitive teams, esports associations and researches collaborate and work together to further study

on the effects of prolonged training towards the physical wellbeing of esports professionals.

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