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Assessing health risks in esports players: An investigation using Mogash scale for online gaming addiction and correlation with BMI

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Abstract
Background: The new era in the gaming world where electronic sports which is known as Esports requires physical and mental health statuses, awareness, capability as well as adaptability. When performing on a competitive or practice basis in any esports and/or online games, different esports players should also understand the hazardous effects of an online games and regarding that their health statuses with managing gaming performance affected by it. MOGASH scale is the newest and structured for the esports and electronic gaming world which is questioning the players about their health statuses in regards of physical and mental well-being. This MOGASH scale is online gaming specific scale and/or outcome measure scale which tends to check the health statuses for the same.
Methods: Cross sectional survey study was conducted on a total of 221 participants, adult esports players from two different online gaming settings were taken for the study as per inclusion and exclusion criteria. Non-probability convenience sampling was done. They were assigned in to complete questions in given questionnaire with the help of MOGASH scale and its interpretation.
Results: A total of 221 participants were screened to check the health statuses regarding physical health and psychological health with by asking questions in questionnaire by using MOGASH scale. The statistical analysis was done. The descriptive result of Pearson's correlation coefficient noted with -0.008 stated no correlation between MOGASH scores and BMI scores. But, MOGASH scale scores noted moderate level of risk on health status with 58% inclusion of esports players.
Conclusion: MOGASH score noted on a moderate level of risk on health status of Esports players and no correlation found between Gaming Addiction and BMI scores.

Keywords: Esports, Mogash, BMI, physical health status, psychological health status

Introduction

Electronic sports is a 21st century's playing approach which is generally known as Esports. Esports is as a form of sports where the primary aspects of the sport are facilitated by electronic systems; the input of players and teams as well as the output of the eSports system are mediated by human-computer and/or human-mobile interfaces. In more practical terms, eSports commonly refer to competitive (pro and amateur) video gaming that is often coordinated by different leagues, ladders and tournaments, and where players customarily belong to teams or other 'sporting' organisations who are sponsored by various business organisations. [1]

During recent years, eSports (electronic sports) have become one of the most rapidly growing forms of new media driven by the growing provenance of (online) games and online broadcasting technologies [1]. As per economic times of India, viewership of esports reached 17 million in 2021 and estimated viewership reached more than 30 million by the end of 2022. Globally it is estimated that viewership increased from 454 million viewers in 2019 to 646 million viewers in 2023 [2].

Video games are played by children, adolescents and even adults (mostly young adults) from decades. Video games is the broad-spectrum term regarding electronic gaming scenario where offline video games, online video games, real time strategy games, adventure games, shooting games like FPS (First Person Shooting) games, multiplayer role-playing games are considered. Recently in 21st century, Video games especially online multiplayer FPS games which can be known as multiplayer battle arena games are in a trend.

Globally, there are now thousands of video game players who define themselves as professional gamers (i.e., so-called esports players and pro-gamers). esports players differ from casual gamers. An esports player is a professional gamer who plays for competition, rather than for fun and/or relaxation, and define gaming as their job. Casual gamers play for fun and recreation, and to entertain themselves [3].

Wagner M.G. in 2006 provided a detailed definition of esports as "an area of sport activities in which people develop and train mental or physical abilities in the use of information and communication technologies" [4]. Hemphill D. added that esports are "alternative sport realities, that is, to electronically extended athletes in digitally represented sporting worlds" [5].

Impact of COVID-19 was the key factor for the emergence of esports on major television sporting networks has triggered once again the perennial discussion on whether esports classify as a sport. Over 400 fine motor movements per minute are carried out by esports players and with professional players reporting practising for over 10 hours every day, this would give rise to overuse injuries [6].

Due to long periods of sedentary behaviour, and unhealthy diets gamers and esports players are at risk for numerous

chronic diseases and all-cause mortality. Health research has started addressing the public health implications of the esports phenomenon, drawing a bleak picture of this mega-trend. [7]

Longer the sedentary period to be involved in only Esports activities may lead to the sedentary lifestyle which will affect the physical and psychological aspects of health. Physical inactivity, sedentary behaviour (SB), and unhealthy diets are major causes of non- communicable diseases and premature death [8]. As esports is a serious competitive video gaming, which has been associated with these unhealthy behaviours, esports developments are often regarded as questionable, especially from a public health perspective [9, 10].

As per World Health Organisation, adults should do at least 150–300min of moderate- intensity aerobic Physical activities; or at least 75–150 min of vigorous-intensity aerobic Physical activities; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week [11] Technological advances, societal influences, changes in transportation, and environment have shaped daily life with decreasing physical activity, and increasing sedentary behaviour [7].

Esports excessive play and its competitive nature leads to physical and psychological problems. Physical issues include eye fatigue, blurry vision, low back pain, tension headache, wrist pain, hand pain, and poor posture while gaming. Psychological issues include depression, anxiety, apathy, uncooperative attitude, tense, sleep disturbances, mental distress, aggressive affect and behaviours, distress in social life, and emotional disturbances.

Long hours of online gaming were associated with the presence of depression, social phobia, obsession–compulsion, interpersonal sensitivity, hostility, phobic anxiety, paranoid ideation, psychoticism attention-deficit hyperactivity disorder and gaming addiction. [12]. So, Esports and its competitiveness may lead to the decrement in the manner of physical status as well as psychological status.

Materials and Methods

A cross-sectional survey study designed to investigate various aspects of online gaming behaviour and its potential impact on health parameters among different types of online gaming players.

A non-probability convenient sampling method was employed to select participants from the target population. This approach allowed for the inclusion of participants who are easily accessible and willing to participate in the study.

The study population comprised diverse types of online gaming players, including competitive esports players, recreational esports players, internet gaming players, collegiate/non-collegiate internet gaming enthusiasts, and esports/internet gaming streamers/entertainers.

A sample size of 221 participants was determined using G*Power software analysis, ensuring adequate statistical power to draw meaningful conclusions from the data collected.

The study spanned a duration of six months, allowing for sufficient time to collect data from the participants and conduct comprehensive analyses.

Data collection primarily conducted online, leveraging online gaming chats, social media platforms, esports organizations, gaming groups, gaming houses, gaming/esports LAN events, and colleges located in the western region of India.

Inclusion Criteria

Participants meeting the following criteria are included in the study:

- Age 18 years and above
- Both male and female
- Playing experience of 1 year and above
- Users of computer and/or mobile internet/online gaming
- Competitive esports players, recreational esports players, and internet gaming players
- Collegiate/non-collegiate internet gaming enthusiasts
- Esports/internet gaming streamers/entertainers

Exclusion Criteria

Participants are excluded from the study if they

- Are below 18 years of age
- Engage solely in offline gaming activities
- Have less than 1 year of playing experience
- Report any upper extremity musculoskeletal injuries in the last 3 months.

Instruments: Data collection instruments include

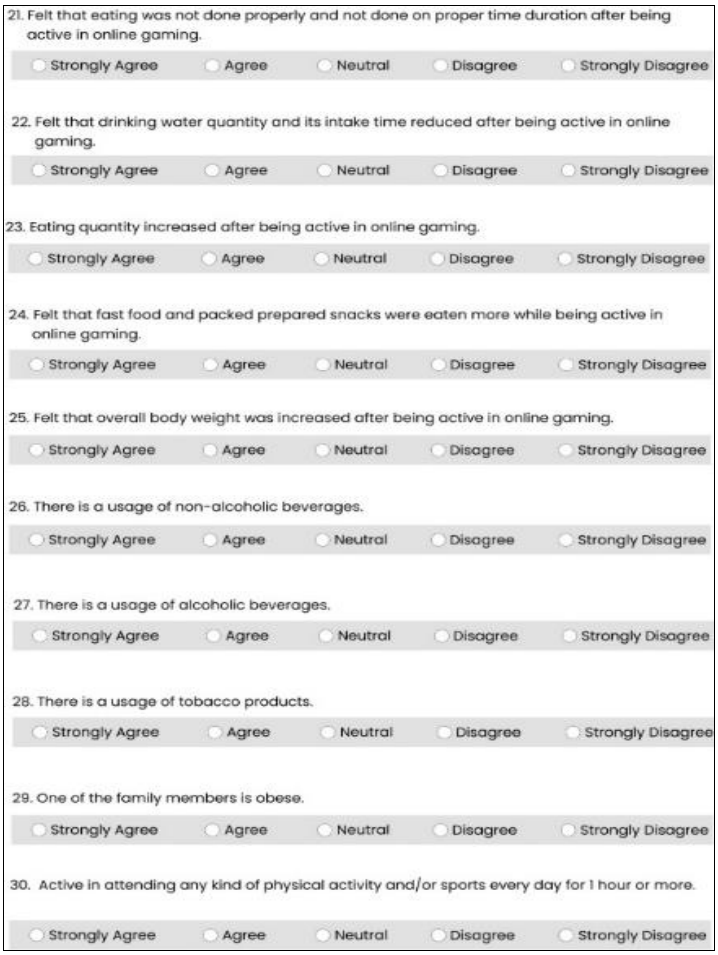
- Online platforms
- Google Forms for survey administration
- MOGASH Scale (Mirani's Online Gaming Addiction and Status of Health Scale) for assessing online gaming addiction and health status. [13] Copyrighted registration ROC no: L-127598/2023
- Body Mass Index (BMI) calculation for evaluating participants' physical health status. [14]

Fig 1: Esports players gaming online: Online PC/Laptop gaming (FPS – First Person Shooting game)

Mogash Scale [13]

Mirani's Online Gaming Addiction & Status of Health (MOGASH) Scale

1. Thinking of playing games or planning priorly to do online gaming.
   ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
2. Felt guilty when playing the game more than expected or planned timing period.
   ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
3. Satisfied after playing the game in settled time period.
   ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
4. Unsatisfied after playing the game and/or have to leave the game prior to the planned time period of online gaming.
   ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
5. Playing online games every day minimum 2 hours or more.
   ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
6. Feeling emptied, irritated, restless and unfocussed when not able to play and/or when stopped playing.
   ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
7. Playing tutorial matches every time before starting the new online games.
   ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
8. Playing practice games/matches every time in the form of warm up to start the game.
   ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
9. Playing games with friends who is known to you earlier.
   ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
10. Playing games with unknown people and also interacting with them while playing.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
11. Making friends online and discussing about the game or planning with them to play games by setting specific time period?
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
12. Thinking to play more and more even after winning and/or losing to be better a better gamer.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
13. Forgetting daily living activities (Brushing, Bathing, Grooming, Eating, etc. daily basic activities) because of online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
14. Losing interest in hobbies and other leisure activities because of online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
15. Resuming with online games even though problems have occurred in life due to online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
16. Giving false answers regarding playing time of online gaming to your concerned persons (Parents, Friends, Therapist, Doctors, etc.).
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
17. Playing online games to escape from reality (Guilt, Anxiety, Rage, Helplessness, Ignorance, Self-doubt, Negative thoughts and any other negative feelings).
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
18. Endangering social life (Social relationships, Education as well as career opportunities, Job, Social gathering, etc) because of online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
19. Felt that physical activities, indoor and/or outdoor activities reduced because of online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
20. Felt that overall general body strength and muscular strength reduced after being active in online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
21. Felt that eating was not done properly and not done on proper time duration after being active in online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree



21. Felt that eating was not done properly and not done on proper time duration after being active in online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
22. Felt that drinking water quantity and its intake time reduced after being active in online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
23. Eating quantity increased after being active in online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
24. Felt that fast food and packed prepared snacks were eaten more while being active in online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
25. Felt that overall body weight was increased after being active in online gaming.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
26. There is a usage of non-alcoholic beverages.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
27. There is a usage of alcoholic beverages.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
28. There is a usage of tobacco products.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
29. One of the family members is obese.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree
30. Active in attending any kind of physical activity and/or sports every day for 1 hour or more.
    ○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree

Table 1: mogash scale interpretation:

Mogash Scale Interpretation		
Score	**Severity**	**Description**
30	Insignificant risk	Minimal impact
31-60	Minor risk	Short-term impact
61-90	Moderate risk	Significant impact
91-120	Major risk	Major Short-term impact
121-150	Severe risk	Major Long-term impact
Scoring depended upon: 1 - 5 score from answers of questions as; Strongly Agree – 5, Agree – 4, Neutral – 3, Disagree – 2, Strongly Disagree – 1.		

Table 2: BMI Scores [14]

BMI	Weight status
Below 18.5	Underweight
18.5-24.9	Normal weight
25.0-29.9	Overweight
30.0-34.9	Obesity class I
35.0-39.9	Obesity class II
Above 40	Obesity class III

Data analysis and Results: The data obtained were analysed with IBM SPSS v16® statistical software. The data regarding BMI and MOGASH Score showed normal distribution. The results which were obtained were considered significant if the value of $p < 0.05$ and the confidence interval of 95% should be satisfied. Following statistical analysis was done: Pearson correlation coefficient for assessing the correlation of BMI and MOGASH Score was done.

Table 3: Statistics for BMI score and MOGASH score with their means and standard deviations.

Descriptive Statistics			
	Mean	**Std. Deviation**	**N**
BMI score	21.9299	4.86145	221
MOGASH score	85.2308	17.87141	221

As above-mentioned table suggests scores with 221 data and the range of mean and standard deviation noted of BMI score 21.92 ± 4.86 and MOGASH score 85.23 ±17.87 respectively

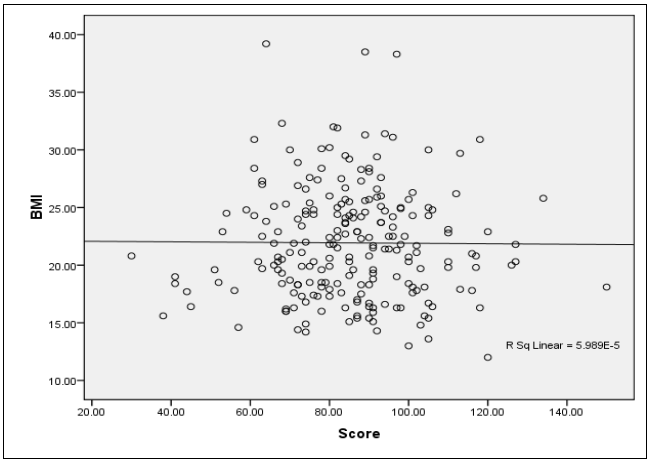
Table 4: Statistics as per thumb rule for interpreting the size of correlation coefficient is as follows. (15)

Size of Correlation	Interpretation
.90 to 1.00 (−.90 to −1.00)	Very high positive (negative) correlation
.70 to .90 (−.70 to −.90)	High positive (negative) correlation
.50 to .70 (−.50 to −.70)	Moderate positive (negative) correlation
.30 to .50 (−.30 to −.50)	Low positive (negative) correlation
.00 to .30 (.00 to −.30)	negligible correlation

Table 5: Statistics for BMI score and MOGASH score with their Pearson's correlation coefficient to each other.

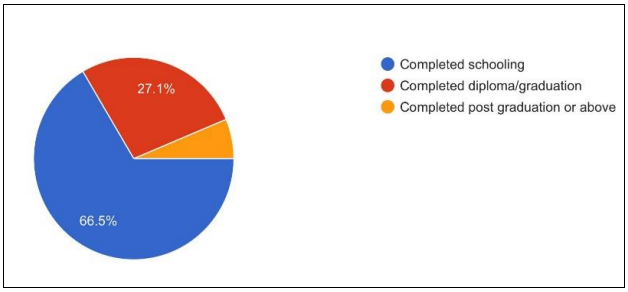
Correlations			
		BMI	**Score**
BMI scores	Pearson Correlation	1	-.008
	Sig. (2-tailed)		.909
	N	221	221
MOGASH scores	Pearson Correlation	-.008	1
	Sig. (2-tailed)	.909	
	N	221	221

As per above mentioned table, Pearson's correlation coefficient noted with -0.008 in statistics. Therefore, according to thumb rule there is negligible and/no correlation between MOGASH scores and BMI scores.



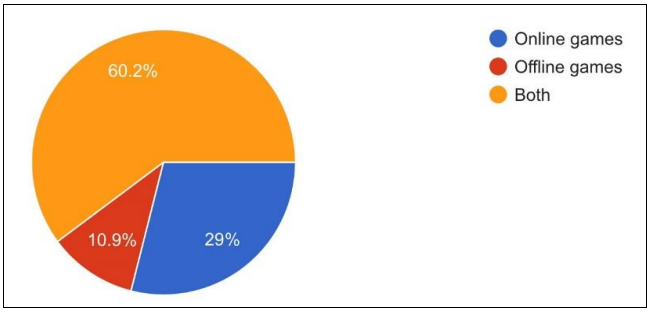
Graph 1: Scatter plot for correlation between BMI and MOGASH scores.

It is seen from the scatter plot that the points are scattered widely in graph and there is no association between 2 variables. Thus, it is noted that there is no correlation between scores of BMI and MOGASH. (Score noted in graph suggests MOGASH score on x axis).



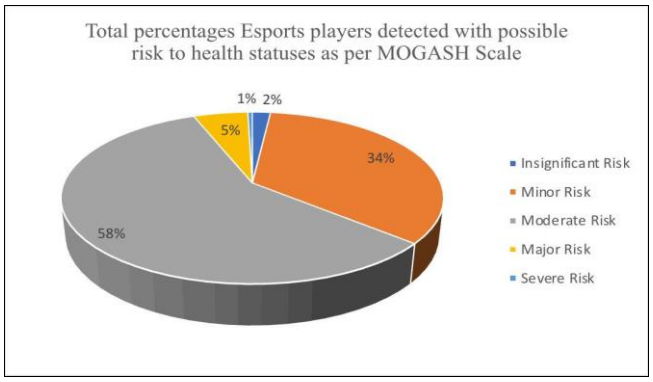
Graph/chart 2: Pie chart noting the esports players basic education.

In above shown pie chart basic education taken by esports players noted to understand how well they are comfortable with online gaming and esports as well. It showed that 66.5% of esports players completed basic education which is schooling, 27.1% esports players completed their diploma and/or graduation and 6.3% esports players completed their post-graduation or above study.
Therefore, it is noted that young adults are more focused in online gaming and/or esports which included both genders.



Graph/chart 3: Pie chart noting the esports players' area of interest to play the games.

In above mentioned pie chart, it is noted that 60.2% esports players having the interest to play games online as well as offline games as well, 29% players are only interested in playing online games while 10.9% esports players having interest to play offline games only. Therefore, it is noted that 70% of esports players having interest in playing online games as per above pie chart.



Graph/chart 4: Pie chart noting total percentages of the esports players detected with possible risk to health statuses as per MOGASH scale interpretation.

In above mentioned pie chart, 1% of esports players are at severe risk, 5% of esports players are at major risk, 58% of esports players at moderate risk, 34% of esports players are at minor risk and 2% of esports players are at insignificant risk to their health statuses as per MOGASH scale interpretation.

Discussion

Electronic sports (Esports), viewed as competitive and organised video gaming which is becoming accepted as a form of sports. Many digital video games associated with Esports are played through various platforms (e.g., computers, consoles, mobile, streaming, or virtual reality) and involve either simulating competitive sports (motion-based) or combative (action- based) activities. [10]

Esports have been around for more than 20 years and continue to thrive economically as a highly profitable gaming industry and also it is having the booming scenarios in India as well. Credits to the advances in digital media and online game-streaming or cloud gaming technologies, there has been a rapid increase, on a global scale, in the popularity of Esports worldwide, evidenced by the exponential growth in participation, media coverage, viewership, sponsorship, and commercialisation.

The popularity of professional Esports continues to soar, with players predominantly being younger individuals, including school-aged children and adolescents as well as college athletes. [10]

Esports, especially some virtual sports and action-based video games (e.g., platformer, shooter, fighting), share some common physical and mental demands with non-digital sports in that Esports also require motor skills, mental agility, processing speed, executive function, motivation and to a lesser extent, physical exertion. [16]

Some action video games, whether played cooperatively or competitively, are beneficial in building skills related to cognitive ability, reading ability, reaction time and sensorimotor skills. They must also hone the essential neurological skills, including effective hand-eye coordination, development of fast reaction times, and rapid decision making in a virtual competitive environment, that are critical for winning and success in Esports games.

The intensity of training required for competitive Esports games paradoxically necessitates sitting in the same position for hours at a time in front of a computer or tele- vision screen, enduring high levels of stress, visual attention, blue light (from light-emitting diodes), and repetitive small-muscle movements, which together equate to a sedentary and, consequently, unhealthy lifestyle. [10]

So, for the 21st century's sporting events which we consider as an Esports, there are less to no evaluation scales or outcome measures as well as clinical guidelines and in respect to that further treatment and/or training protocol by which one can truly focus on gaming as a career opportunity where one can be healthy and fit for the longest of periods to achieve stability in a way of health as well as wealth and morality from the ground basis to be in gaming community.

Mirani's Online Gaming Addiction and Status of Health Scale which is called MOGASH Scale was made for checking the health statuses of an individual in a way of physical as well as psychological fitness in a primary basis. MOGASH Scale is made, structured and introduced in this research to check that how hazardous effects or impacts of online gaming on the health statuses of a normal gaming individuals.

MOGASH Scale was structured, ethically corrected and noted by institutional ethical committee and as well as noted with highly qualified English proficiency certification scaled inventory by which any researcher can check the hazardous effects of online gaming on health statuses regarding physical as well as psychological in primary basis.

MOGASH Scale contains 30noted sentences/questions in a Likert scale-form where those notes or questions directly indicating to online gaming and its physical and psychological behaviour.

MOGASH Scale is giving 5 options to select only one best option related to asked questions in a form of Strong agreement to Strong disagreement like Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree. One option to give answers should be selected compulsory for the compulsorily asked 30 questions.

In MOGASH Scale scoring depends upon: 1 - 5 score from answers of questions as; Strongly Agree - 5, Agree - 4, Neutral - 3, Disagree - 2, Strongly Disagree – 1 where total MOGASH Scale's score varies only between 30 the lowest to 150 the highest.

MOGASH Scale interpretation suggests different severities of risk/hazardous effects as per different scoring results where MOGASH score of 30 suggests insignificant risk severity with minimal impact, score between 31-60 suggests Minor risk severity with short-term impact, score between 61-90 suggests Moderate risk severity with significant impact, score between 91-120 suggests Major risk severity with Major short-term impact, score between 121-150 suggests Severe risk severity with Major Long-term impact.

There was one study done on professional Esports players which are sampled internationally in which relationship between physical activity levels and motivation orientation were correlated by using international physical activity questionnaire and sports motivation scale respectively. It was concluded with the inversely correlation between motivation and energy expenditure. [17]

As compared to previously mentioned study, this study was aimed to check the health statuses of physical as well as

psychological way by a questionnaire but which included with related health status questions in MOGASH Scale.

There was another study which investigated relation between Internet gaming disorder scale (IGD Scale) score and Gaming addition scale for adolescents (GASA) score in relation with internet gaming disorder (IGD) with the conclusion of positive correlation when it came with previous significant predictors of IGD and with the predictive validity of the scale by correlation, regression and mokken scale analysis. IGD might not be applied as in unidimensional scale because of tolerance item and variables. [18]

With the comparison of above-mentioned study, MOGASH Scale was made with an idea to approach with multidimensional health statuses regarding the betterment of the online gaming industry and future online gaming perspectives with the relative tolerate questions in questionnaire according to sum up physical and mental statuses of an Esports player. MOGASH Scale showed moderate affection in this study as most of the noted scores counted and analysed between 61-90 suggests Moderate risk severity with significant impact on health. This included not only mental health like IGD scale score but also physical health aspects as well.

Though from this study, it was yet to be predict the perfect validity as well as reliability which will be noted and analysed for the future betterment of Esports, esports health as well as MOGASH Scales predictive measurement approaches as MOGASH Scale was structured primarily for predicting future health hazards in upcoming esports and internet and/or online gaming era.

There was one study which showed the lifestyle, gaming, habits and musculoskeletal complaints in collegiate esports players from the universities of USA and Canada due to esports competitions which concluded on a note of seeking medical attention towards esports because of notified complaints of musculoskeletal problems with the specification of eye fatigue, neck and followed by back pain as well as hand and wrist pain. [19]

As compared to above mentioned study, this study noted the health statuses of esports players in physical and mental aspects. This study also checked the correlation between the BMI (body mass index) score and MOGASH Score which showed that no correlation significantly. As per results showed scores with the range of mean and standard deviation noted of BMI 21.92 ± 4.86 which basically comes under the normal range of the BMI scores and scores of MOGASH 85.23 ±17.87 which basically comes under the ranges of Moderate risks range of the MOGASH scores.

There was no correlation (-.008) with ($p<0.05$) found between the BMI score and MOGASH score. But, in this study as per MOGASH Scale scores which checks health statuses regarding mental and physical well-being with pre-set scoring numbers and/or rankings which mentioned previously, in regarded per calculation it showed most Esports players in Moderate risk range and then major risk range of hazards of online gaming.

There had been one meta review study done which undertaken on the physical, social, and psychological health outcomes of competitive online gaming and associated screen use, revealed that a need for further review and research into lifestyle health outcomes including diet and sedentary behaviour among young esports and competitive video gaming participants. [20]

MOGASH Score can be the benchmark for the esports health to identify and to determine whether the medical attention really needed or not as per noting the health statuses on a primary basis of approach towards health in esports.

Conclusion

Health status of Esports players can be checked by MOGASH scale as it covers the physical and psychological well-being questions in it.

There was no correlation noted between MOGASH score and BMI score noted so it can be mentioned that there was no correlation between online gaming addiction and health status as per BMI score.

Limitation and Future scope

For limitation scenarios regarding the MOGASH scale still needs an approach with the large implementations to make it more reliable for the betterment of the esports health.

For the future scope in the perspectives of esports, MOGASH scale can be the benchmark health outcome measures in future in the world of esports and esports health where a quick assessment can be taken for physical and psychological impacts regarding online gaming or esports where it will need to clarify that esports player is fit for competitive esports scenarios or not.

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Conflicts of interest

None declared

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