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The Impact of Games on Gamers and Society

By

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Declaration

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed

Melwyn Anthony

Dated

19 October 2021

Abstract

The substantial popularity of video games and their power to make players enjoy them radically led to reshaping the industry of video games from the perspective of entertainment to the other side such as education and promoting social relationships. There are various genres of games like action, adventure, puzzle, racing and strategic games, which has various impacts on the player's mental health as well as physical wellbeing. Therefore this thesis will explore the positive and negative aspects of these genres. This thesis aims to determine the effects of video games played over the computer or any gaming console, by gamers and non-gamers and show the positive and negative impact of it on them. This research aims to bridge the gap between the impacts of games on people through existing studies and how the positive impact can be maximized in gaming industries. Based on previous studies for both qualitative and quantitative data done in this domain, this thesis will then address the proofs and exhibit the validity of their conclusions in a qualitative manner. Finally, this research thesis will discuss the effect of games on gamers and society as an initial step towards identifying what aspects enhance the gaming experience, and how such effects or experiences can be beneficial for the game development for increasing positive impact, and will lead to an advancement in the gaming industry.

Acknowledgement

I remember feeling both scared and excited at the prospect of completing a masters thesis, and now that it is finished, I think those two emotions sum up the experience quite accurately. The last year has been both challenging and rewarding and I feel confident in saying that I come away from it having learnt a great deal. It has not been a lone undertaking, however, and I wish to acknowledge the following people for their contributions.

My sincere thanks go to my supervisor, Dr. Brett Wilkinson, who provided endless support and encouragement throughout this research and was always happy to answer my many questions and gave their valuable time to me. I could not have asked for a better person to work with. I would also like to thank all of the staff and students at Flinders University who provided considered advice regarding my research.

My thanks also go to my parents, Simon Anthony and Mercy Anthony, who continue to support and encourage me in everything I do. I would also be thankful to my younger brother Marshal Anthony, who is an online gameplay streamer, and has inspired me to know more about gaming and their impacts on people. And lastly I wish to acknowledge the family pets, Shera and Hexa, who always entertain me on video-call from my home country during the writing of this thesis.

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Chapter 1

Introduction

With the persistent development of new technology in every aspect of life, most of the recent technologies that were earlier contemplated as entertainment technologies have become irreplaceable in our everyday lives. This is especially true for new media technologies, such as smartphones, virtual worlds, the internet and video games, which have had an intense impact on our daily lives (Quwaider, Alabed, & Duwairi, 2019). Video games are known as interactive experience that primarily focus on entertaining players. These video games allow the player to explore virtual environments, playing within a set of rules and conditions, dependent on the different types of games (Quwaider, Alabed, & Duwairi, 2019). Moreover, in addition to the common entertainment focused video games, the application of this technology has been repurposed to teach academic content, social abilities and different skills to the players playing it (Kafai & Burke, 2015).

Video games have the potential to impact the player, causing some physiological and psychological changes to them. These changes could either be good or bad, therefore, video games have been examined by many researchers in the fields of computer science, education, social sciences and psychology (Quwaider et al., 2019). There are various genres of games that are played across the world such as racing, action, strategic, simulation, role-playing, sports and adventures, therefore every video game has different characteristics based on the genres that define them (Quwaider et al., 2019).

Research by (Quwaider et al., 2019) has shown that majority of players are either children or teenagers, which further demands the continued need for responsible design and development in video games. Some players have demonstrated behaviours related to the concern of using these games excessively, which eventually leads to changes in the player's thoughts about video games from being just for entertainment purposes or for consuming time to addictive tendencies (Quwaider et al., 2019).

The popularity of computer games has gained much attention in the field of education, that even scientists and researchers have explored various proposals to apply them in the academic domain (Carvalho, 2017). There are various games that can serve as an effective method to teach students

about science. A study conducted by (Epstein, Noel, Finnegan, & Watkins, 2016) showed that video games can be used as a teaching tool to explain the science behind addiction, and results from the study demonstrate the importance of games for younger students and how knowledge is gained in both competitive and collaborative conditions. For instance, In child development, physical literacy also plays an important role in improving basics skills like critical thinking, enabling contribution for various physical activities, such as sports and dancing (George, Rohr, & Byrne, 2016).

There are several elements of violent video games that may lead to aggressive behaviour when playing such games (Zendle, Cairns, & Kudenko, 2015). For instance, playing shooting games may increase the aggression level and playing fighting games may increase the belligerence and hatred within the players, whereas, playing roleplay or fantasy games may increase anxiety and socially inactive (Quwaider et al., 2019).

The ability to know player characteristics and the impact games have on players, as well as the wider society, is one of the most important tasks for a game designer to consider. Ethical and responsive game development is essential to increase the ability of games to positively influence individuals and society in general (Harrison & Roberts, 2011). Such information enables designer to create productive video games that can influence the players and could be designed in a manner that elevates the skills and ability of the players. Therefore, this thesis will provide a comprehensive study of the positive and negative impact of games on players and society over a long and short period of time and how negative impact can be minimized so that the positive impact can be maximized. Video games have evolved into interactive entertainment systems with a high economic implications on society (Sánchez, Vela, Simarro, & Padilla-Zea, 2012). Therefore, the findings presented in this thesis, would be beneficial for gaming industries to understand the impacts and requirements needed for cognitive and physical development of the gamers.

The remainder of this thesis discusses the detailed survey and analysis of the impacts from games on gamer and society. Chapter 2 describes the methodology used to gather information for the research and their integrity. Chapter 3 discusses the literature related to the effect of games. Chapter 4 discusses the results generated from the research done on the current domain. Chapter 5 discusses the analysis that evaluates the results. Finally, chapter 6 provides discussion on the impact from games and summarizes the future work that could be undertaken by the gaming industries.

Chapter 2

Methodology

This section provides an outline of the methodology used for the study to answer the research questions. This research used qualitative methods and a combination of primary and secondary sources for better exploration. As the reviewed research used both qualitative and quantitative data types in their data analysis, the conclusion produced is based on the study analysed by the previous assessments. This section will discuss the study area, the search criteria, the study selection, inclusion criteria and exclusion criteria, the data collection process, and literature search results.

2.1 The study area

The core focus of this research was to review the impact that video games have on gamers and society, as such articles which included video game impact discussions, both in terms of functional and structural data are included in this research protocol. The existing research publications were studied based on their reference to positive and negative effects of exposure to video games. Both experimental and correlational studies were included. However, to focus the work and review the most contemporary work, only recent publication dates (2009-2021) were applied and considered in terms of research findings for this thesis.

2.2 The search criteria

A systematic search was conducted using a set of keywords that were anticipated to occur in the title or abstract of any study looking at video game impacts with a positive or negative effects on gamers and society. A list of studies from various databases including Pubmed, Scopus, Google Scholar, Flinders Library, and Cochrane Library, were retrieved. The search criteria restricted the articles based on publication dates from January 1, 2009, to April 31, 2021. Based on the predefined keywords and search criteria, a substantial number of articles were determined to be duplicated in multiple databases, therefore the references were merged after a rigorous examination. These keywords were divided into two groups. First and foremost, a set of keywords aimed at locating papers that employed video games as a technique or as a research goal. Search phrases linked to “video games” (in various orthographic forms), categories of players (casual, core and professional gamers), allusions to serious gaming and popular game

genres were included in the keywords. Second, multiple sets of keywords were used to find publications that looked into the positive and negative effects of the games from different genres. Keywords related to behavioural, psychological, cognitive and physical impact from different genres of games. And, keywords that mentioned the learning, educational and teaching aspects were used to obtain required data. The search terms used are mentioned in Table 1.

Table 1 Keywords for search criteria

“entertaining games impact”	“games therapy”	“adventure game impact”
“racing game impact”	“cognitive impact games”	“gamers behaviour”
“video game impact”	“puzzle game impact”	“games teaching”
“game health”	“problematic games”	“game addiction”
“learning games”	“positive impact games”	“negative impact games”
“brain training games”	“game behaviour”	“educational games”
“game analysis”	“game aggression”	“action game impact”
“online games impact”	“rehabilitation game”	“game social experiment”
“sports game impact”	“game psychology”	“gamers psychology”
“games impact”	“mind games”	“gamers addiction”
“behavioural control games”	“mental stress games”	“healthy gamers”

2.3 The study selection

As the presented search keywords yielded a high number of results, rigorous exclusion criteria were used to narrow down the final list of articles for review. During the evaluation process, a substantial number of false-positive studies occurred due to high variability in language and the diversity of keywords used in the search. Twelve years of research papers were reviewed, and their data has been collected in a systematic process. Several analyses were made based on the gathered data. Under this research, 73 works of literature were peer-reviewed and the other 12 were published but had not been peer-reviewed. The integrity of the research papers and journals were examined using H-Index, which is a metric for evaluating the cumulative impact of an author’s scholarly output and performance, it is used to help measure quantity with quality by comparing publications to citations (H-index, 2020). In terms of a citation for the provided literature, 42 literature had citations below 30, 8 articles had 30 to 60 citations, 7 pieces of literature were cited 60 to 90 times, 16 articles between 90 to 200, and 5 works of literature had above 200 citations. Table 2 provides details of this data as it related to individual articles. For this research, Scimago Journal and Country Rank were used as a database for finding the H-Index of the journals, and Semantic Scholar was used for sourcing the number of citations for each articles.

Table 2 List of literatures with H-Index and Citations

S.No	Title of the paper	Year	Journals	Peer-Reviewed	H-Index	Citations
1	Diagnostic and statistical manual of mental disorders.	2013	__Online Library__	No	-	52116
2	Challenging games help students learn: An empirical study on engagement, flow and immersion in game-based learning	2016	Computers in Human Behavior	Yes	178	708
3	Investigating the impact of video games on high school students' engagement and learning about genetics	2009	Computers and Education	Yes	179	524
4	Looking for Gender: Gender Roles and Behaviors Among Online Gamers	2009	Journal of Communication	Yes	131	290
5	Turning shortcomings into challenges: Brain–computer interfaces for games	2009	Entertainment Computing	Yes	29	196
6	Meta-Analysis of Action Video Game Impact on Perceptual, Attentional, and Cognitive Skills	2018	Psychological Bulletin	Yes	313	194
7	Gamification of cognitive assessment and cognitive training: A systematic review of applications and efficacy	2016	__Online LIbrary__	Yes	-	192
8	Causal effects of violent sports video games on aggression: Is it competitiveness or violent content?	2009	Journal of Experimental Social Psychology	Yes	142	178
9	Mobile Augmented Games in Playable Cities: Humorous Interaction with Pokémon Go	2017	Psychology, Computer Science	Yes	-	4
10	The MindGame: A P300-based brain–computer interface game	2009	Neural Networks	Yes	148	164
11	Effect of Playing Violent Video Games Cooperatively or Competitively on Subsequent Cooperative Behavior	2012	Cyberpsychology, Behavior, and Social Networking	Yes	143	160
12	Constructionist Gaming: Understanding the Benefits of Making Games for Learning	2015	Educational Psychologist	Yes	126	159
13	Computer-based, personalized cognitive training versus classical computer games: A randomized double-blind prospective trial of cognitive stimulation	2011	Neuroepidemiology	Yes	87	141
14	Playability: analysing user experience in video games	2012	Behaviour and Information Technology	Yes	78	131
15	How feedback boosts motivation and play in a brain-training game	2015	Computers in Human Behavior	Yes	178	117
16	New developments in brain research of internet and gaming disorder	2017	Neuroscience and Biobehavioral Reviews	Yes	240	104
17	Chances and Limitations of Video Games in the Fight against Childhood Obesity—A Systematic Review	2017	Psychology, Medicine	Yes	-	19

S.No	Title of the paper	Year	Journals	Peer-Reviewed	H-Index	Citations
18	Preventing intrusive memories after trauma via a brief intervention involving Tetris computer game play in the emergency department: a proof-of-concept randomized controlled trial	2018	Molecular Psychiatry	Yes	213	101
19	Video Game Training Does Not Enhance Cognitive Ability: A Comprehensive Meta-Analytic Investigation	2018	Psychological Bulletin	Yes	313	95
20	Neural Basis of Video Gaming: A Systematic Review	2017	Frontiers in Human Neuroscience	Yes	114	94
21	The Racing-Game Effect: Why Do Video Racing Games Increase Risk-Taking Inclinations?	2009	Personality and Social Psychology Bulletin	Yes	193	87
22	Gaming for Health: A Systematic Review of the Physical and Cognitive Effects of Interactive Computer Games in Older Adults	2015	Journal of Applied Gerontology	Yes	50	85
23	Computer Games in Education	2019	Annual Review of Psychology	Yes	243	76
24	Intense video gaming is not essentially problematic.	2017	Psychology of Addictive Behaviors	Yes	107	67
25	The effects of video game realism on attention, retention and aggressive outcomes	2011	Computers in Human Behavior	Yes	178	64
26	Brain-computer interface game applications for combined neurofeedback and biofeedback treatment for children on the autism spectrum	2014	Frontiers in Neuroengineering	Yes	41	61
27	The impact of adventure video games on foreign language learning and the perceptions of learners	2013	Interactive Learning Environments	Yes	44	61
28	Video gaming and children's psychosocial wellbeing: A longitudinal study	2017	Journal of Youth and Adolescence	Yes	118	59
29	Computer games can get your brain working': student experience and perceptions of digital games in the classroom	2015	Learning, Media and Technology	Yes	44	51
30	Using sequential observations to model and predict player behavior	2011	__Online Library__	No	-	48
31	The Changing Face of Video Games and Video Gamers: Future Directions in the Scientific Study of Video Game Play and Cognitive Performance	2017	__Online Library__	Yes	-	38
32	Impact of videogame play on the brain's microstructural properties: Cross-sectional and longitudinal analyses	2016	Molecular Psychiatry	Yes	213	35
33	Triple Whammy! Violent Games and Violent Controllers: Investigating the Use of Realistic Gun Controllers on Perceptions of Realism, Immersion, and Outcome Aggression	2015	Journal of Communication	Yes	131	35
34	Toward Game-Based Digital Mental Health Interventions: Player Habits and Preferences	2017	Journal of Medical Internet Research	Yes	142	34

S.No	Title of the paper	Year	Journals	Peer-Reviewed	H-Index	Citations
35	The use of computer games in classroom environment	2018	__Online PDF__	No		31
36	Computational Thinking in Constructionist Video Games	2016	International Journal of Game-Based Learning	Yes	16	30
37	The Relationship between Player's Value Systems and Their In-Game Behavior in a Massively Multiplayer Online Role-Playing Game	2017	Computer Science	Yes	-	2
38	It's not the model that doesn't fit, it's the controller! The role of cognitive skills in understanding the links between natural mapping, performance, and enjoyment of console video games	2015	Computers in Human Behavior	Yes	178	26
39	The Association Between Video Gaming and Psychological Functioning	2019	Frontiers in Psychology	Yes	110	25
40	Model-checking for adventure videogames	2009	Information and Software Technology	Yes	103	25
41	Impact of Nintendo Wii Games on Physical Literacy in Children: Motor Skills, Physical Fitness, Activity Behaviors, and Knowledge	2016	__Online Library__	Yes	-	23
42	Designing Serious Computer Games for People With Moderate and Advanced Dementia: Interdisciplinary Theory-Driven Pilot Study	2017	JMIR serious games	Yes	-	21
43	AI Researchers, Video Games Are Your Friends	2016	Studies in Computational Intelligence	Yes	68	21
44	Brain-Computer Interface Games Based on Consumer-Grade EEG Devices: A Systematic Literature Review	2020	International Journal of Human-Computer Interaction	Yes	67	20
45	Playing the computer game Tetris prior to viewing traumatic film material and subsequent intrusive memories: Examining proactive interference	2015	Journal of Behavior Therapy and Experimental Psychiatry	Yes	75	19
46	Contextual advertising in games: Impacts of game context on a player's memory and evaluation of brands in video games	2017	Journal of Marketing Communications	No	47	18
47	Impact of video game genre on surgical skills development: a feasibility study	2016	Journal of Surgical Research	Yes	108	18
48	Playing Active Video Games may not develop movement skills: An intervention trial	2015	Preventive Medicine Reports	Yes	31	18
49	Gaming motivation and problematic video gaming: The role of needs frustration: Motivation, need frustration, problem gaming	2018	European Journal of Social Psychology	Yes	111	17
50	The Effects of Fifa 2015 Computer Games on Changes in Cognitive, Hormonal and Brain Waves Functions of Young Men Volunteers	2015	Basic and Clinical Neuroscience	Yes	18	17

S.No	Title of the paper	Year	Journals	Peer-Reviewed	H-Index	Citations
51	Acceptability of an adventure video game in the treatment of female adolescents with symptoms of depression	2016	Research in Psychotherapy: Psychopathology, Process and Outcome	Yes	12	16
52	Children's Movement Skills When Playing Active Video Games	2015	Perceptual and Motor Skills	Yes	69	14
53	Improving Children's Mental Health with a Digital Social Skills Development Game: A Randomized Controlled Efficacy Trial of Adventures aboard the S.S. GRIN	2017	Games for health journal	Yes	31	13
54	Brain training: Memory games	2016	Nature	Yes	1226	13
55	Examining Computer Gaming Addiction in Terms of Different Variables	2018	World Journal on Educational Technology: Current Issues	No	5	12
56	Augmented reality tools for sports education and training	2020	Computers and Education	Yes	179	11
57	Violent video game players and non-players differ on facial emotion recognition: Violent Video Games and Emotion Recognition	2016	Aggressive Behavior	Yes	92	11
58	The interpersonal-psychological theory of suicide and exposure to video game violence	2014	Journal of Social and Clinical Psychology	Yes	94	11
59	Serious games for learning : a model and a reference architecture for efficient game development	2017	__Online Library__	No	-	10
60	The Impact of Video Games on the Players Behaviors: A Survey	2019	Procedia Computer Science	Yes	76	9
61	A reflective study into children's cognition when making computer games	2016	British Journal of Educational Technology	Yes	95	9
62	Do coping strategies moderate the relationship between escapism and negative gaming outcomes in World of Warcraft (MMORPG) players?	2018	Psychology, Computer Science	Yes	-	25
63	Bacon Brains: Video Games for Teaching the Science of Addiction	2016	Journal of Child and Adolescent Substance Abuse	Yes	33	7
64	Higher Graphical Fidelity Decreases Players' Access to Aggressive Concepts in Violent Video Games	2015	__Online PDF__	No	-	6
65	Augmented reality for learning in distance education: the case of e-sports	2019	Journal of Physical Education and Sport	No	27	4
66	Investigating the Impact of Integrating Vocabulary Exercises Into an Adventure Video Game on Second Vocabulary Learning	2021	Journal of Educational Computing Research	Yes	60	3
67	Gamers on Gaming: A Research Note Comparing Behaviors and Beliefs of Gamers, Video Game Players, and Non-Players	2020	Sociological Inquiry	Yes	51	3
68	Computer games as distraction from PAIN: Effects of hardware and difficulty on pain tolerance and subjective IMMERSION	2020	International Journal of Human Computer Studies	Yes	122	3

S.No	Title of the paper	Year	Journals	Peer-Reviewed	H-Index	Citations
69	The Feasibility and Potential Impact of Brain Training Games on Cognitive and Emotional Functioning in Middle-Aged Adults	2018	Games for health journal	Yes	31	3
70	Effects of the Contextual Variables of Racing Games on Risky Driving Behavior	2017	Games for health journal	Yes	31	3
71	The effect of educational computer games on students' academic achievements and attitudes towards English lesson	2020	Education and Information Technologies	Yes	41	2
72	Priming effect of computer game violence on children's aggression levels	2016	Social Behavior and Personality	Yes	58	2
73	The impact of online brain training exercises on experiences of depression, anxiety and emotional wellbeing in a twin sample	2021	Journal of Psychiatric Research	Yes	136	1
74	The interaction of contextual realism and fantasy tendency on aggressive behavior following violent video game play: An indirect test of violent content effects	2019	Computers in Human Behavior	Yes	178	1
75	Language for Specific Purposes and Graphic-Adventure Videogames: Supporting Content and Language Learning	2017	__Online Library	Yes	-	1
76	Virtual Rehabilitation in Parkinson Disease: A Dopamine Transporter Imaging Study	2021	American Journal of Physical Medicine and Rehabilitation	Yes	101	0
77	A Multimodal Analysis Combining Behavioral Experiments and Survey-Based Methods to Assess the Cognitive Effect of Video Game Playing: Good or Evil?	2020	Sensors	Yes	172	0
78	Design and Evaluation of an Adventure Videogame Based in the History of Mathematics	2020	Lecture Notes in Computer Science	Yes	400	-
79	The distant Horizon: Investigating the relationship between social sciences academic research and game development	2020	Entertainment Computing	Yes	29	-
80	Can video games help in mental health recovery	2019	__Online__	No	-	-
81	MMORPG Player Classification Using Game Data Mining and K-means	2019	Lecture Notes in Networks and Systems	No	14	-
82	Genius Learning Strategy of Basic Programming in an Adventure Game	2018	IOP Conference Series: Materials Science and Engineering	Yes	44	-
83	Digital Australia 2020	2019	__Online PDF__	No	-	-
84	Factors Influencing ESL Players' Use of Vocabulary Learning Strategies in Massively Multiplayer Online Role-Playing Games (MMORPG)	2021	Psychology	No	-	36
85	Competitive Video Game Play: An Investigation of Identification and Competition	2016	Communication Research	Yes	104	-

2.4 The inclusion and exclusion criteria

For this research thesis, any potentially relevant research had to meet the following inclusion criteria: (1) the literature should explain the specific impact from the games through a relevant experiment conducted within participants or previously conducted survey; (2) preliminary studies were randomised controlled trials, and the randomisation process was either done on an individual or a group basis (such as a classroom); (3) the pooled effect size was calculated using test data on executive function (cognitive flexibility, inhibition and working memory), with at least one outcome having quantitative data. Conditions for exclusion from the study included: (1) Irrelevant role of video games; (2) absence of impact analysis and their correlations; (3) review articles; (4) non-healthy participants.

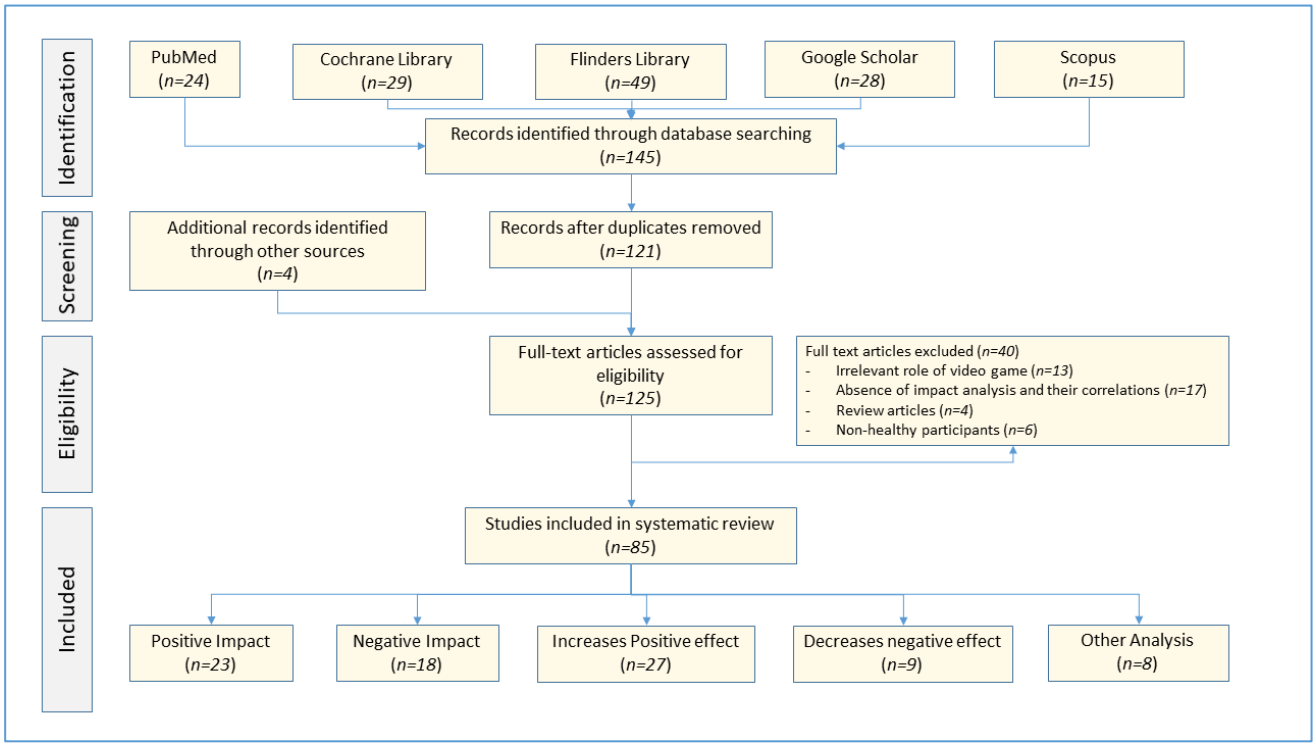

Figure 1 Flow diagram for the procedures of eligible studies selection for this thesis

2.5 The data collection process

For each study, aspects of the following data were extracted such as (dependent on the focus of the articles), (1) sample characteristics, including sample size, inclusion and exclusion of criteria, average age and range, and gaming experience; (2) goal of the study, gaming abuse and exposure to violent content; (3) popular genre of games; (4) design of the study; (5) required cognitive techniques and medical standards applied in the study; (6) functional and structural behavioural changes observed in the study. After that, studies were divided into categories based on whether they offered structural or functional data, as well as whether they addressed aggressive or addictive elements in terms of different genres of video games. This research has presented a

synthesis of the key results in the discussion section of this review by connecting the brain alterations with their cognitive and behavioural responses. In many cases, the original publications offered their explanations for the occurrences and attempted to integrate the broader style from a cognitive perspective. As a result of this study, it can be determined which studies sought to interpret empirical cognitive data, which papers discuss cognitive and behavioural implications without analysing them, and which studies present the changes or improvements that occurred in behavioural and cognitive aspects.

2.6 Literature search results

The latest review of electronic searches (as of April 2021) retrieved a total of 145 articles. During the preliminary screening an additional 4 articles were included making 149 in total articles. From this, 64 articles were excluded based on the irrelevant role of video games (n=13), absence of impact analysis and their correlations (n=17), review articles (n=4) and non-healthy participants (n=6). Finally, the meta-analysis included 85 articles in which 23 demonstrated the positive changes from games, 18 showed negative changes, 27 showed increases in positive impact, 9 showed decreases in negative impact and 8 articles showed other analytical information required for this research (refer back to Figure 1).

Chapter 3

Literature review

This section will explore the expert research conducted in the field of gaming and their effects on people and thus specifically focus on evidence and evidence-based theories rather than claims and assurance. This research is important as there are very few studies that show the impact of different types of games on gamers and their surrounding people and thus this research can be helpful while designing and developing games on a commercial scale.

3.1 Learning perception of games

Due to the result of swift evolution in computer technology, new ways have been found in the field of education to teach students and people new skills and improve their cognitive abilities (Yesilbag, Korkmaz, & Cakir, 2020). Various researchers are investigating video games, trying to identify the suitability of using educational computer games that can ameliorate student learning for educational knowledge and cognitive skills (Mayer, 2019). Games with computerized cognitive training focus on optimising intellectual functioning or restoring impairment via training different aspects of emotions or cognition, like, positive revaluation, working remembrance or consideration with a definite objective of transfer to real-world functioning (Routledge, Williams, Harris, Schofield, & Gatt, 2021). Various research has been focused on how games change the behaviour of the player, but very little research has focused on how such games can motivate players towards their goal both inside and outside the game world (Burgers, Eden, van Engelenburg, & Buningh, 2015). The current research presents an opportunity for future research that can further help the game developers to create beneficial games for the players.

In another article (Allsop, 2016), teenage children were allowed to build and design their game so that researchers can study the process of childrens' thinking during the learning processes and results show the information about the mental activities of those participants. Children also spoke about the working of their mind as like a room to plan their games, visualizing answers and testing innovative ideas on the screen that led to deeper thinking for better availability of ideas. This article could be helpful to analyse the cognitive changes in the children who play and design video games. A related paper (Weintrop, Holbert, Horn, & Wilensky, 2016) elaborates a variety of learning conditions that are known as constructionist computer games that are particularly

appropriate for developing a learner's computational reasoning abilities. The author show three design principles to which learners could create interest in constructing computational thinking strategies with games and these are, development of relevant computational artefacts, the core of powerful ideas and the learner independent exploration opportunity. The author also said that these design principles can also help people in a positive way, to design any games by themselves and improves their creative skills. Research (Beavis, Muspratt, & Thompson, 2015) has been done on primary and secondary school students to check whether computer games can be used in the learning process and develop childrens' brain to grab new skills. In Beavis, et. al. research, a survey had been conducted with 270 primary and secondary school students in Year Levels 4 to 9 or aged between 9 to 14 in 6 different Queensland schools. This research could be relevant for the topic presented in this thesis, as it has core information regarding the changes games can make on children's brains and how such games can help to develop their skills towards the better future. Computerised Intellectual training focuses on upgrading cognitive behaviour or improve learning level via training different components of feeling or cognition such as conclusive revaluating, working memory or consideration with the definite objective of transfer to practical functionality (Routledge et al., 2021). According to (Makin, 2016), research, the field of effectiveness of brain training games are also controversial, also this article stated that "even the meta-analysis do not agree", and thus the current research checked the integrity of the controversial studies as well.

Many examinations have indicated that video games can help the student acquire language more easily and therefore this research explains the benefits of the adventurous game that are focused on vocabulary learning. A study conducted by (Chen, Hsu, Chen, & Todd, 2021), define adventures game in 2 different versions, one was the normal adventure game and another is the same with lexical exercise. Three different types of tests were conducted pre-test, post-test and delayed post-test. Moreover, the findings from this experiment show that adventure games alone helped them to acquire new words and thus suggested that developers of such games should focus on learning exercises in video games. The implementation of adventure games in the field of education is a complex task that requires the capability to study and substantiate the use of it among large number of population (Moreno-Ger, Fuentes-Fernández, Sierra-Rodríguez, & Fernández-Manjón, 2009). (Rocha & Dondio, 2020) paper describes the study of an adventure game developed to fulfil the mathematical learning curriculum for primary school students. In this game, the player needs to travel from ancient Egypt and ends in the modern world to win the game through learning and testing challenges for themselves. This game introduces players to a real-life character like Pythagoras of Samos, teaching about their contributions to the field and

thus using such knowledge to solve puzzle problems. 88 individuals of first and second class students from an Irish primary school participated in the test that was conducted for three weeks, which included playing the games during weekly sessions for 45 minutes to 1 hour. This paper aims to understand the impact of such games on student's mathematics performance and level of understanding calculations. It increases the performance of the students but on female students specifically, mathematics anxiety was found to increase. Imagine if children interact with real-life mathematicians and learn basic or advanced principles of maths from them. Basic programming is the fundamental expertise that must be acquired, therefore a learning strategy is required to establish a favorable learning environment to optimise the end result, one of which is the Genius Learning Approach (Junaeti, Sutarno, & Nurmalasari, 2018). The purpose of this study (Junaeti et al., 2018), was to observe the game influence, genius learning strategy of basic programming in an adventure game and cognitive abilities of students. Results showed the difference in learning outcomes between the classroom acquiring with media and acquiring without media. This study would be beneficial for the current research, to understand the learning outcomes by acquiring different environment in the classroom.

Another article (Papadakis, 2018), shows the implementation of computer games in the classroom environment as a learning aid, curiosity developer and motivator. The research found that games can be an effective way to improve student learning performance in the classroom. Other research has also shown the favourable link between learning and student engagement while playing video games throughout the years. Papadakis' article explains the benefits of integrating digital games at different levels of education and also talks about the factor of difficulties such as cost of games, equipment, and lack of technical support. A study was conducted whose results suggest that in terms of education, computer games can be used as a tool to teach students (Yesilbag et al., 2020). This study was conducted particularly for teaching the English language to students and data analysis showed that the experimental group performed better than the control group in the test of academic achievement. As educational and training tools, Serious Games are becoming increasingly popular. However, they still have a long way to go before they are widely deployed. The purpose of this study (Carvalho, 2017) was to aid in the design and development of digital educational serious games by lowering the expenses of serious game production, while still achieving the games educational and entertaining goals. The findings show that the suggested approach and tools might be a useful mechanism for lowering the costs and promoting high-quality serious game development.

3.2 Influential outlook of games

A wide range of theoretical discussion and experimental studies related to the impact of computer games on people and the factors affecting the adoption of their positive effect and minimizing the negative side have been conducted and examined over the last few years. Over the last several decades, research into the perceptual, attentional and cognitive advantages of playing video games has expanded, but the techniques employed today are becoming outmoded as both video games and players persistently evolve. (Dale & Shawn Green, 2017) highlight some of the development in the video game industry and analyse how these changes may influence gaming research. This article helps to understand the changes in the scientific study of video gameplay and the cognitive performance of gamers. Most of the research for cognitive benefits from games have been done with the younger people, the impact of such games on individuals aged 18-60 years is less clear, and such contrary finding with different study's outcomes, could lead to the lack of knowledge while developing impactful games for every aged group (McLaughlin, et al., 2018).

There is various evidence that highlights the benefits of brain training for psychological wellbeing, but very few studies show the transfer effects of mental wellbeing with quality of life and reduces the negative frame of mind, thus this article (Routledge et al., 2021) examines and presents the importance of these types of research and assessed in the same study. According to the study, conducted on 352 healthy, non-gamer pairs of twin adults, it sought to examine the benefits of cognitive and sentimental training of the brain over the internet and their transfer consequences over psychological symptoms like depression and anxiety (Routledge et al., 2021). The study showed that online brain training has the capability to enhance sentimental cognition but has no clear evidence of improving psychological wellbeing symptoms. The study inspect the influence of brain training games on sentimental cognition and symptoms of psychological wellbeing and the ability for indirect advantages on mental health and progress in the performance of emotional cognition. Research by (Lobel, Engels, Stone, Burk, & Granic, 2017), showed that competitive gaming decreases prosocial behaviour, mostly among children with high frequency of gameplay, as compared to cooperative gaming and these are some limitations that need to be considered.

Another study (Quwaider et al., 2019) has been conducted that shows the assumption of the correlation between video games and player's behaviour or emotions in two different aspects. Initially, it shows the impact of computer games on player's behaviour in terms of skill improvements or increasing the level of negative emotional conditions or behavioural problems.

Another aspect includes arguing possible connection between the effects of video games on the players. This article defines mainly two methods used by the researchers to gather the required data and these are self-reported data and in-game collecting data. Self-reported data is the collection of data using interviews, surveys or ethnographic observation that is conducted before or after playing the game. Whereas, the other method collects data directly from the game as the player engages with the video game. Mostly, self-reported data were used but they have various drawbacks such as it requires considerable time, substantial amount of work to inspect and categorises the gathered information and separating noise from the data. Therefore, gathering information based on in-game data becomes the initial choice to researchers recently, as it has the capability of collecting and analysing the data automatically based on the player's behaviour and emotions within the game. Therefore, with the help of this literature we can conclude that, before gathering the information for this research paper, it is required to analyse the source and method used while conducting the experiments. This article explains the impact of video games on behaviour and aggression, but it also explains the disapproval of the impacts from video games that are based on weak evidence and not properly concluded results.

According to the research (Griffiths, Eastin, & Cicchirillo, 2016), sports-based games are popular genre of video games but the research of the impact from such a game genre is limited. Various researchers have mentioned different understanding about the competition element that plays an important role in games. Some researchers argue that player's aggression is due to the competitive feature of video games, not from the violent aspect. On the other hand, the researcher also reveals that positive effects and enjoyment can be fetched by the competitive feature of the video game. This article helps this study with more information and understanding regarding the effects of competition features in any video game. Research by (Barnett, Ridgers, Reynolds, Hanna, & Salmon, 2015), shows the impact of sport-based Active Video Game (AVG) on children's real and deduced object control skills. This study is suitable for this research as it discussed (AVG) which are increasing in popularity among younger players. This research has been examined and concluded that AVG may be useful to give basic knowledge of sports to children but the number of times participants played game is not viable to build skill because the whole experiment was conducted for 6 weeks with 1 hour/week which is not sufficient to build the skill of typically developing children. According to the authors of this research, more study needs to be done in this segment as with the use of different consoles and different perceptive of the players, may give mismatched outcomes.

Various other papers talk about the negative impact of the games played by young people. This article (Zheng & Zhang, 2016) shows the negative impact of games, for instance, the game

Counter Strike, encourages people to operate guns and aims to place the player in a violent competitive environment. Concerning this, many teachers have reported that students are negatively affected by violence in games and encountered great stress while interacting with such types of students. However, in the same paper, it is said that aggression is one of the negative behaviour that may be reduced in children by playing computer games that can make people relaxed. This literature shows how anger in people can be reduced by making them play some games that can make them relaxed and calm. Due to the negative effects mentioned in (Edition, 2013), like loss of interest in other social activities, aggression and obsession with gaming, this has attracted the attention of various researchers in this field. A study (Kurt, Dogan, Erdogmus, & Emiroglu, 2018), that conducted a comparative quantitative research method and survey, shows computer gaming addiction levels using different variables such as gender, daily gaming times, academic grade and purpose. Findings from this survey revealed a remarkable comparison between video game addiction and variables like daily gaming time, playing games with known or unknown people and gender but no difference with some variables like the purpose of the game or grade of the student. This research is beneficial for further understanding the effects that game addiction creates on young minds. Another study (Groves, Plante, & Lishner, 2019) shows the effect of violent video game content on aggressive behaviour. An interaction revealed that participants who were continuously playing fantasy games experienced blast like noise from another player as compared the participants playing realistic game. Additionally, the results concluded that participants who engage with violent games seem to act more aggressively on the following gameplay. This research would be beneficial to the work presented in this thesis, as it provides supporting evidence for the effects of violent content in games and shows the details of novel methods for assessing violent media content. Aggression that occurs from violent computer games may vary by their trait of aggressive level and gender. (Zheng & Zhang, 2016), two studies have been conducted in which the results from the first study showed that Virtual Cop-2 was perceived as a violent game but Fight Landlord was recognized as non-violent game. Results of study two showed that boys appeared to be more aggressive after playing Virtual Cop 2 game as compared to girls.

Another study (Jeong, Park, Yeo, & Kim, 2020) has been conducted to that explains the cognitive impact of video games. However, when the data were analysed across each participant, there was no significant association between Self-Reports Analyses and a standard Behavioural Experiment, showing that the cognitive effect of video gameplay is complicated. This study helps in understanding the cognitive impact across people while playing games. Motivation is frequently cited as a predictor of a problematic style of video game involvement, suggesting that

people's gaming is interfering with their ability to perform optimally (Mills, Milyavskaya, Heath, & Derevensky, 2018). This study by (Mills et al., 2018), explores the relationship between gaming motivations, usual frustration and Problematic Video Gaming which could be important for present research as it addresses the practical as well as theoretical consequences in the context of current research.

3.3 Society perception of games

Another study (Kort-Butler, 2020), shows the stereotypical beliefs about gamers by most people and how these beliefs can be a matter of concern and may be problematic for society. This survey includes approximately 900 young adults and compared self-recognised gamers to other types of video game players and non-video game players, and found that there were differences in the behaviour in terms of the time they played but little differences in their attitude toward game violence. However, people who do not play video games when compared to players and gamers showed more negative attitudes towards video games and their impact. In terms of sociality, non-players were more engaged and supportive, however, gamers were not socially isolated and had good social value. The author concluded that the number of hours played by the players and gamers does not have any correlation with beliefs or behaviours, thus, this research explains the importance of acknowledging the practical, empirical and theoretical differences between numbers of hours played, the identity of the gamer and gamer stereotypes. This article would be beneficial for this research as it explains the difference between the gamers, players and non-gamers based on time spent and the type of game they played. The research by (Passarelli et al., 2020), shows the awareness of research on critical aspects of the correlation between game research and the game industry by interviewing 14 researchers and 30 game developers. Results of this study suggests to increase the financial support and opportunities for game projects that includes both researchers and developers. This research would be beneficial for understanding the recommendations for the improvement in communication between academics and developers.

3.4 Advanced Human-Computer Interface perception of games

Technology like computer games, Virtual Reality (VR) and Augmented Reality (AR) may be utilised to divert attention away from pain and thus such types of interventions are both efficient and cost-effective, as well as avoiding medication-related problems (Fairclough, Stamp, Dobbins, & Poole, 2020). These simulations are determined by various factors such as sensory immersion and challenge-based immersion. Therefore, under this study, four experiments were conducted to investigate the impact of both the factors using computer-generated games. This

study helps in understanding the positive effect of games on pain tolerance as from this study, it has been determined that challenge-based immersion is the most effective way for technology to divert attention away from pain. This study (Soltani & Morice, 2020) shows the characterisation and understanding of the benefits of Augmented Reality in educating sports and training events, AR adds to the reality of athletes and may have extra benefits over other technology. The result of this paper shows different AR approaches that might be used for training and providing a report and thus new guidelines could be initiated to minimize the gap between players with dissimilar experience levels to improve the users' experience.

Brain-Computer Interfaces (BCIs) are systems that allow the user to control computer applications using signals generated by their brain. BCIs were originally developed for critically paralyzed patients to communicate with each other (Finke, Lenhardt, & Ritter, 2009). In this article (Vasiljevic & de Miranda, 2020), the advancement of the implementation of BCI with Human-Computer Interaction (HCI), has been suggested as the future of gaming. This conclusion was defined through a review using several research papers and showed the issues and research opportunities in this field as most of the investigation is based on the quantitative aspect of BCI system. However, few investigations have been conducted to analyse the qualitative aspect of the BCI system in games. This paper helps in understanding the vast future of gaming using BCI systems. In the last several decades, training activities in the field of motor and sports science have seen a significant transformation, moving away from strictly technical approaches towards more theoretical approaches. The goal of this research paper (Viscione & D'Elia, 2019) is to hypothesise the implementation of online educational activities with the use of new technologies like augmented reality, virtual reality and robotics that provides an optimal educational offer for students. This paper helps in understanding the applications of high-end interactive technologies in the field of gaming and their positive implications on players. A systematic review by (Bleakley et al., 2015) showed the cognitive as well as physical impacts of interactive computer games in older people. This study could further be improved by tailoring interventions for older adults. However, this study would be beneficial to understand the impacts of interactive computer games, and how such games optimizes gamer's motivation and enjoyment.

3.5 Medical perception of games

Another study (Tziraki, Berenbaum, Gross, Abikhzer, & Ben-David, 2017) has been conducted to develop a theory-based serious game for People with Dementia (PwD) as input from the multi-disciplinary group who are experienced with ageing, dementia and gaming theory as direct feedback from end-users. The result shows that PwD found the game was engaging and

entertaining and even older adults found the game too easy to play. This study is useful for understanding the psychological impact of the games on People with Dementia. This article by (Mandryk & Birk, 2017), intended to characterise the currently unknown link between gaming activity and measures the well-being in this study so that designers can make informed decisions when creating game-based mental health therapies. Results of this study imply that games are an appropriate strategy for mental health therapies since they are widely played by people with a variety of indicators of mental health.

A total of around 15 million children are believed to have mental health problems from playing adventure games and with many more at risk. The goal of this particular research (Sanchez, Brown, Kocher, & DeRosier, 2017), is to see if a computer game, specifically an adventure game might help children with social skills deficiencies improve their mental health and social abilities. The result of this research showed that participated children who played adventure games improved their performance in post-test than pre-test as compared to the children who did not play the game in social literacy, social satisfaction, bullying victimization and social anxiety. This concludes that children who struggle with social skills may get benefits from online interactive games to improve their mental health. Similar research has been done by (Von Der Heiden, Braun, Müller, & Egloff, 2019), who shed light on the link between video gaming and psychological functioning in gamers. This experiment was conducted on 2,734 participants of which 2377 were males and 357 were females of average age 20-30 years old. Results show that the psychological functioning of the gamers depends upon the different genres of games they played. However, the impact of video games on children's psychological development is still a point of contention (Lobel et al., 2017).

The paper of Neural Basis of Video Gaming: A systematic review (Palaus, Marron, Viejo-Sobera, & Redolar-Ripoll, 2017), aim to find the relationship between the usability of video games and their correlations in the neural network that has the entire variety of cognitive factors that they encompass. Research by (Aliyari et al., 2015), show how e-sport games can change the cognitive performance, hormonal levels and electroencephalographic signal were calculated when it was tested on young male volunteers. The result from this research shows that mental fatigue which was measured by the PASAT test did not change after the game as compared to before the game was played. Another article (Toldo et al., 2021) concluded that virtual rehabilitation protocol increases the dopamine transporter in the region of putamen contralateral that was clinically most affected body side of the patients with Parkinson disease, even the quality of life and motor signs were also improved with the use of virtual rehabilitation. Parkinson is a disease in which the brain stops creating dopamine and it is majorly found in older people. Under

this experiment, nineteen patients with Parkinson diseases gone through an 8-week virtual rehabilitation protocol using a gaming console called XBOX 360S. TRODAT-1 is a single-photon emission computer tomography that is used as a radioligand that checks the dopamine transporter in the brain of the patients. This literature is useful as it shows the benefits of natural user interface (NUI) games in the field of virtual rehabilitation.

According to a piece of strong evidence by (Weinstein, Livny, & Weizman, 2017) that shows the brain process behind Internet Gaming Disorder (IGD) appear to be similar to those of drug addiction. Functional Magnetic Resonance Imaging (FMRI) shows the internet game playing is linked with the changes in brain regions like the region responsible for control and attention, emotional regulation, motor function sensory-motor planning and impulse regulator. Some studies also argue that video game playing is also linked with dopamine release similar to those with drugs consumption in terms of magnitude. Another online study was published (Richman, 2019) that explains the benefits of video games by recovering from mental health challenges. This study was conducted on 20 Veterans who ranged from 25 to 62 years old and results shows significant benefits like increase in socializing, Adaptive coping, Eudaimonic well-being and reducing the feelings of exhilaration, pain and trauma. This study gives strong proof about the benefits of video games but the study itself was conducted on a very small set of people and thus considering the precision of the result might be doubtful. Game interaction are frequently used by designers of digital treatments for mental health because the native motivation that emerges from game-based therapies may enhance engagement and lead to increased treatment effectiveness (Mandryk & Birk, 2017). There are, however, unanswered issues concerning the suitability of desktop or mobile treatments more appropriately and intervention potential, like depression, which is the reason for people to play the game for mental health.

Thus, this current study aims to find the following research question:

a) What are the positive effects of different genres of games on both gamers and society?

b) What are the negative effects of different genres of games on both gamers and society?

c) How we can increase the positive impact of games?

d) How we can decrease the negative impact of games?

Chapter 4

Results

One of the most important segment used to know the effects of games on players and its usability is using the characteristics of the player which exhibit through the emotions and behaviour that separates different players from each other (Quwaider et al., 2019). Moreover, in terms of analysing the impact and behaviour of players through their gameplays, MMORPGs (Massively Multiplayer Online Role-Playing Game) are considered as:

> *"a gold mine of personality data"(Wang & Yu, 2017).*

Therefore, to know about player's characteristics is an important part of any game design and has an essential implications of positive impact by escalating games' potential for the society (Odierna & Silveira, 2019).

From the simplest game like Peek-A-Boo to the complexity of Call of Duty, games have influenced many people for decades (Annetta, Minogue, Holmes, & Cheng, 2009). However, research has demonstrated that playing video games can manifest many changes in the player's behaviour in both positive as well as in negative ways, and these changes are clearly visible, especially in adolescents players, as their personality and response are still growing and have not been entirely established yet (Quwaider et al., 2019). This is significant because the most powerful development in games has been the increase in their social identity (Williams, Consalvo, Caplan, & Yee, 2009). The impact that computer games may have on gamers can be positive, such as enhancing mental skills, social skills and problem solving. However, the impact can also be negative such as violence, anxiety, aggression and stress (Quwaider et al., 2019). The following section will explore the positive as well as negative impacts of games on the player's and non-gamers. There are various protocols that are designed to evaluate the impacts regarding emotional and behavioural problems based on numerous factors within a specified standards such as Youth Self Report, which helps in analysing the psychological problems like anxiety, aggression, depression or other types of controlled or uncontrolled behaviours (Quwaider et al., 2019). Another research by Nijholt (Nijholt, Bos, & Reuderink, 2009) has explored the use of Brain-Computer Interface in the field of games and concluded that this technology enables player with multiple ways to add input modalities and control game situations in a more convenient manner.

A common impact of extreme computer gaming in young people is the increase in emotional and social problems (Kurt et al., 2018). These issues may lead to excessive gaming, avoiding social activities, outbursts of aggression due to poor performance in the game, lying about playing games and the time spent playing, using games as an escape plan from problems, and despite its negative effect still continuing to play video games. Players take on the persona of the game's avatars or invest their own attitudes and perceptions onto the game experience, which plays a cognitive role in motivating players. According to (Griffiths et al., 2016), this agency and identification with the game can be defined as the process where the experience within the game seems like the events are happening to them. This leads players to connect with their virtual character emotionally in the game, which further motivates the player toward achieving the goal for their character. Another study showed that active or passive sports consumption through video games enables people to establish the perception of fan-ship and recognition with their preferred team that leads to create the feeling of competition among the players and competitiveness also significantly linked with both hostility and enjoyment (Griffiths et al., 2016).

There are various arguments that video games are essentially not problematic and to study this, research conducted by (Király, Tóth, Urbán, Demetrovics, & Maraz, 2017) whose results suggests that the amount of time spent gaming is weakly related to negative cognitive characteristics such mental disorders and the escape motive, both of which have been linked to problematic use. Their results suggest that, the amount of gaming time appears to be an inaccurate predictor of problematic use. Another study by Giladi (Giladi et al., 2011) said that cognitive performance of the people declines steadily with age, and result from the same study concluded that computer games can help old people to improve cognitive performance. In this section we will understand the Positive and negative impacts of games, and how we can increase the positive impact and reduce the negative impact of the games.

4.1 Positive impact

There are various benefits related to the playing of video games, whether is a single player or within a group of players.

Strategic games are responsible for boosting motivation within the player, both within the game as well as in real life, as the game mechanics increases and develops an incremental theory of intelligence. Strategy games also use failure as motivational tool to re-evaluate strategies to achieve target goal in life and has a tendency to train new behaviours that leads towards educational success (Quwaider et al., 2019).

According to a study conducted by (Ewoldsen et al., 2012), 119 participants were asked to play

Halo-2 (a first-person shooter game) to assess their social interactions. The players were placed into teams to act collaboratively in a competitive game mode against other teams. The study concluded that playing a violent game in a group increased the feelings of unity and collaborative appealing between the team members.

In terms of medical science, surgery is one of the most complex task in this field by the professionals as it requires lot of stability. According to the study by (de Araujo et al., 2016), playing complex games such as first-person-shooters has the capability to increase the stability of hand movements. Even though the participants played such games for less time, the study still showed the improvement in the performance of the game.

According to the research done by (Iyadurai et al., 2018) on 37 participants, who were tasked with playing Tetris to assess the potential that gameplay can be helpful for minimizing the effect of trauma like distressing and burdensome experience. One of the female participants said that playing Tetris helped her in minimizing intrusive memories of her motor vehicle accident that had created repetitive horrific visuals in her mind. Some of the other participants indicated that their mood and emotional state had improved and asked to play the game for a little longer even after the intervention period.

Role playing games are becoming very popular as players get an opportunity to live and experience the inner life of the game's avatar. Such games has various social benefits as well, such as an increase in helping behaviour, decreases players aggressive cognitions, increases cooperative behaviour and increases leadership skills.

4.2 Negative impact

According to the research, video games like first person shooter games may lead to a rise in behavioural problems of the players like aggression and anger, Research suggests that such games have realistic graphics displaying violent scenes, high quality detail of aggressive acts and simulation of real blood scenes make it more engaging, mostly for those of an adolescent age (Quwaider et al., 2019).

Massively Multiplayer Online Role-Playing Games (MMORPGs) are a very popular form of entertainment among gamers and thus gained attention towards the studies that show the relationship between MMORPGs and psychological problems like anxiety and depression (Quwaider et al., 2019). The total gaming market revenue of US increased to $2.43 billion in 2016 in digital sales alone (Bowditch, Chapman, & Naweed, 2018). In these types of games, a set of virtual characters called avatars are displayed to the players in order to choose one of these avatars

to start playing, and each character has various abilities that can deal with different challenges, to achieve the goal. Many studies have been conducted that suggest playing as aggressive characters in such games can escalate the rate of aggression of the player in the real world (Quwaider et al., 2019). From the above relationship between player's virtual and real life behaviour, it is clearly noticeable that players try to satisfy their real world demands by establishing it in video games, and thus addictive players think that video games are the right place to inflate their own true selves by satisfying their unfulfilled needs in real life (Quwaider et al., 2019).

There are various sport-based games that are violent and as a result it impacts player's aggression level. Research done by (Anderson & Carnagey, 2009) shows that playing violent sport-based video games has increased the aggression in terms of attitudes, effects, behaviour and cognition when playing such games excessively. Evidence from the research by Marina (Krcmar, Farrar, & McGloin, 2011) suggests that exposure to violent video games is actually linked to rise in aggression within the player. The results from (McGloin, Farrar, & Fishlock, 2015), showed that using realistically controlled firearm console mostly impacts aggression, and the participants playing with the normal gun controller also realized the approach of game feelings and authenticity of fascination. This increases concern about the harmful effects of realistic firearm controlled games among the players.

Contextual advertising plays an important role in games and on gamer's memory. Results from the study by (Yoo & Eastin, 2017), shows that the player's ability to process advertising messages implemented in a game is influenced by the actual characteristics of the game context. These results shows that the context of the emotional games impair brand memory. This happens because of their sensory engaging characteristics, the emotional context grabs more mental resources. Moreover, this study concludes that in terms of negative context, the memory impairment is much stronger. Gamers may not consciously recall names of the brand, but they still process the internal advertisement's information in the game.

An experiment conducted by (Deng, Chan, Wu, & Liu, 2017), shows that racing games had a long term negative effect in risk taking inclination while driving on the actual road. This is because of the competitive nature of racing games, which generates greater excitement and risk taking elements that influence players to be more irresponsible while actually driving. Another article (Fischer et al., 2009) showed that majority of the fatal accidents are due to irresponsible driving behaviours that includes competitiveness, over-speeding and risky driving, by male teenagers who largely consumes racing video games.

A study by Ryan (Rogers, Bowman, & Oliver, 2015) showed the differences in level of frustration

and performance with game rating using motion controller and traditional push button controller. Results from the study showed that participant who played with motion controller were more frustrated with the gameplay as compared to the traditional controller. This shows that player's frustration could also be linked with the type of controller player uses. Another study by (Takeuchi et al., 2016) conclude that Video Game Play (VGP) has indirectly linked with interruptive development of microstructure in verbal intelligence and substantial brain region. However, Children's VGP as a daily habit demonstrated that settings in which children play videogames for long time may contribute to adverse neurocognitive development at least from one perspective.

4.3 Increase positive impact

Based on the findings from qualitative data analysis done in (Kurt et al., 2018), most of the students choose to play skilled games as it improves the tendency of learning and motivates them to achieve in real-life. If such skilled games increases the interest in learning new skills and knowledge among young children, then developing such games could create the positive impact on them and teach them the skills that are required to build their life. According to the study (Hamari et al., 2016), in which author have discussed the positive effects of rhythm, immersion and engagement in game-based learning environments have showed many positive results. This study concluded that both the skill level and challenges in the video games have positive impact on learning. Even though the immersion and skill levels does not consequentially affect the learning level but the commitments by the players towards the video game is increased. This study, recommends that to keep the level of competition as high as possible in any educational video game, the design of such games must contains fun elements and keep the pace with the development of the player.

In a descriptive analysis by (Kurt et al., 2018) that was conducted on some students to examine what types of game they want to design and showed that most of them were interested in designing action games and less were interested in designing survival games. Action based games like 'Call of Duty', 'Street Fighter' and others have various components such as weapons, aggression, fighting and fear that make it more interesting to young people, even though when one of the student participants asked what type of game they wanted to design they replied 'I would want to design an informative-action game with strange creatures. I would also want this game to be for 13+ (only for 13-year-old and above)', while another participant stated 'I would design a game of fear. I would want to scare everyone, with ghosts and everything'. These statements from participants were examined and later observed that the nature and expression of such games makes it more interesting to players as these games often uses guns and has a fear element in it. These statistics from the study (Kurt et al., 2018) shows that the reason behind the popularity of action game is because of its nature of fun and thrill.

Similarly, adventure based games were also preferred by 29 students when they were asked to design the game (Kurt et al., 2018). One of the students put down, 'I want to design a game full of adventure, so we can learn new things by discovering them'. Another student mentioned, 'I would prefer to design an adventurous game that could be played by both girls' and boys', while wrote 'it would be an adventure game. Because it's more fun'. Adventure games can also be used as a tool for Language for Specific Purposes (LSP) (Casañ Pitarch, 2017). There are already many universities around the world that have adapted this system to teach students about LSP that involves teaching non-linguistic aspects in order to interact in a specific given context. Another research by (Carrasco, 2016) showed the used of adventurous video game in the treatment depression in female adolescents, and the result form this study concluded that such games can be used as a tool in the context of their psychotherapies. Similarly puzzle games in the language domain helps to introduce, examine and develop specific forms of language from skilled fields and evolve the cognitive strategies based on the study of objects and space at the same time. Another research concluded that, MMORPG genre game can be used for teaching language to children with the help of implementing different strategies within the game (Ng, Rino Sharieful, & Chew, 2021). According to the same study, there are various factors that affects the experience of the players while learning language, and these are; (a) the role of the player with storyline, (b) freedom to learn anywhere, (c) play with multiple people that enables social interaction, and (d) collaborative behavior among the MMORPG community. And thus, such type of games can increase the learning environment for the players.

If the nature of such games could be used without any aggression and violence, then such games can provide a positive impact on player's mental health and simultaneously create a fun and thrill factor at the same time. Active video games are popular as they motivate players to be more physically active while playing game, they have been encouraged to be used in schools for physical education programs and also as a scheme for overweight or inactive children to be more active (Barnett et al., 2015). Exergames has the combination of both video gameplay and physical activity as the player's movements are captured by cameras and processed to the control of the game, and such games encourage people to do physical exercise while entertaining themselves (Mack et al., 2017). Playing games daily within limited time bound has direct association with working memory and problem solving skills to improve the brain activity that starts in adolescence and even in non-expert players as well.

4.4 Decrease negative impact

Those that spend the most time playing video games are the early teens or adolescent age and there are many meaningful and meaningless games that can helps in giving the direction towards the

stages in life and therefore, this age plays an important role in changing their personality for good or worse (Quwaider et al., 2019). For instance, if young children spend their time to learn new skills or good habits, then such things stays them with them further in future, and if they spend their time on something meaningless then that could create a negative impact on them.

The location based Augmented Reality game like Pokemon Go mentioned in (Andujar, Nijholt, & Gilbert, 2017), allows players to meet other players in the outside physical world and create a small community related to their interests. This game encourages people to go outside, to achieve their desired goal and explore new places through their gameplay. This game reduces the negative impact of depression and anxiety as it helps to explore new places and keep the players both physically and mentally active. Another research from (Hulteen, Ridgers, Johnson, Mellecker, & Barnett, 2015) showed that playing active video games like table tennis, tennis and baseball on Xbox KinectTM improves real life movement skills. Therefore such active elements in games can be beneficial, especially for those who doesn't contribute themselves in physical activities.

Chapter 5

Analysis

According to the descriptive analysis of the data collected by (Kurt et al., 2018), showed that the most popular games student played was skill-based games (rated highest by 272 people), like dressing, cooking, blowing balloons, etc, whereas, games played 169 times were racing or sports games like, 'Need For Speed', 'FIFA', 'Pro Evolution Soccer' and 'National Basketball Association'. Students were also interested in playing Action games with around 164 times that included weapons like, 'Call of Duty', 'Counter Strike', etc, and puzzle game with 155 times like 'Candy Crush Saga' and 'Who Wants to Be a Millionaire?'. Strategy games were also rated as interesting among students who played it 94 time such as 'World of Warcraft', 'League of Legends', 'Age of Empires', etc. Students also like open world games like GTA which they mentioned 84 times. And the least preferred games were the platform games like Mario and the augmented reality game like Pokemon Go. From this study we can understand that Skilled games, sports games, Action games and puzzle games play an important role in terms of impacting a large number of people.

A recent series of meta-analytic studies and extensive study into the psychology of expertise have shown that various forms of cognitive training like working memory training, enhance performance exclusively in the trained tasks (Sala, Tatlidil, & Gobet, 2018). With the development of Artificial Intelligence in the field of video games, this can also lead towards the positive impact on the cognitive skills of the player, as these games are created and are implemented on high-end consoles like Xbox and Play Stations (Togelius, 2016). Positive and negative effects from violent video game playing can effect neurocognition and social cognition that can be seen in facial emotion of the players (Diaz, Wong, Hodgins, Chiu, & Goghari, 2016). According to (Lumsden, Edwards, Lawrence, Coyle, & Munafo, 2016), cognitive tasks are frequently perceived as time-consuming, difficult and monotonous, resulting in participant disengagement, and thus may have a detrimental influence on data quality or intervention effectiveness. Therefore, careful application of gamification can give a way to produce engaging and yet scientifically valid cognitive tests and in the future it is likely worthwhile to continue developing gamified assessment.

Chapter 6

Discussion

There are many researchers who are now aiming their awareness of video games on players from negative side to positive side. However, there is a necessity to do more research on the positive side of video games and how the gaming industry can develop such games that can be beneficial for the players as well as to the society in coming future (Quwaider et al., 2019). According to Prensky (2006, p. 4), apart from learning in school, children can learn useful and positive lessons from video games. Gee(2007,p. 10) argued that, good games are actually helpful in creating problem solving abilities that generate deep learning skills (Mayer, 2019). There is no uncertainty that video games act as a motivation to players in achieving their goals, general social effects and improvement in emotional state (Quwaider et al., 2019). As we now know players adapt what they play as a virtual character in the game world. This knowledge should motivate developers to create the types of games that can improve the adaptiveness of skill and behaviour in real life with the help of strong positive impact of the in-game personality (Quwaider et al., 2019). Also with the help of adventure games, players can learn and enhance their English listening skills, reading skills, vocabulary and increases motivation within themselves (Chen & Yang, 2013). All these positive impacts of games significantly improve cognitive abilities, increases motivation, and enables improved in physical activity.

According to the (Brand, Jervis, Huggins, & Wilson, 2019) based on the US survey, around 55% of persistent game players said playing video games helped them to get connected with their friends and around 46% of the gamers said gaming helped their family spend time together. However, research that has been conducted in this field shows that action video gameplay is linked with drawbacks, such as, delay discounting or risk taking, but there are other genres like role playing games or real time strategy games that are also associated with considerably higher levels of such risks (Bediou et al., 2018). Gaming can also create resistance against pain and fear associated with a suicide attempt. Research by Gauthier (Gauthier et al., 2014) showed that playing excessive violent video games can lead towards the feeling of suicide attempt through the persistent feeling of pain and frightening stimulation. The results from the study also showed the clear relationship between suicidal feeling and excessive violent video games from 781 participants, and no other meaningful significant outcomes were found under this research. According to a study by (James, Zhu, Tickle, Horsch, & Holmes, 2015), conducted on 28

participants, there was no significant reduction in the feeling of trauma after playing Tetris.

Many children have acknowledged that some games could assist in the development of skill and transfer to increased sports competence (Barnett et al., 2015). Video games enable players to become involved in crafting the narrative of the game rather than acting as a passive consumer of the game's content (Griffiths et al., 2016). The prospect of improving cognitive capacity by training has been one of the most prominent issues in cognitive psychology in the last two decades, owing to its significant potential scientific and collective consequences (Sala et al., 2018). Medical aspects (under **section 3.5**) from the current study helps to understand the cause and treatment through playing games. A study by (Friedrich et al., 2014) designed an innovative game that had socially interactive elements and yielded neural-based feedback that directly linked with the trained signals through machine learning and also the behaviour that is augmented in it.

Serious games have the potential to expand the reach of successful programs for children who can access them by overcoming logistical and implementation constraints, like accessibility, cost and travel, which restrict traditionally delivered mental health interventions. Based on the findings of this study, it is reasonable to conclude that there are both positive and negative effects of the video games. However, more experiments and research needs to be done on this domain to understand the implications of responsible design on games and on the gaming industry, to promote the development of beneficial products for gamers. The systematic literature review discussed in this thesis is an initial step towards identifying what aspects enhance and reduce the gaming experience; understanding and application of these findings will lead to an advancement in the gaming industry.

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