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Survey of User Needs: eGaming and People with Disabilities

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Abstract

The convergence of several trends in recent years – rapid growth of electronic gaming as both participatory sport and spectator sport in the US and globally, growing sophistication and increasing focus on accessibility by the game-making industry, and rapid social changes caused by the 2020 COVID-19 pandemic – requires better understanding of the landscape of electronic gaming for people with disabilities. This paper analyzes survey research data on participation in electronic gaming by people with disabilities to understand levels of participation and social-psychological effects. Convenience sampling was used to collect data via an online survey from 402 adults with various disabilities. Participants were recruited through the Consumer Advisory Network (CAN) and the Accessibility User Research Collective (AURC), national networks of people with disabilities in the United States developed and maintained by researchers at Shepherd Center, a rehabilitation hospital in Atlanta, Georgia. Data show people with learning disabilities, anxiety and limited stamina play electronic games significantly more than those with other disabilities. Word games are the ones most played by each disability type, followed by role-playing, action and adventure games. Respondents play mostly alone and for fun and relaxation. Small percentages of respondents play e-games for building skills, exercise, learning or rehabilitation.

Keywords

Information & communications technology (ICT), video games, electronic games, e-gaming, disabilities

Introduction

Participation in electronic gaming (or e-gaming, e-sports) has grown considerably in the United States and globally in recent years and is projected grow rapidly in coming years. The Consumer Technology Association's survey titled "2019 Future of Gaming" estimated that 192 million people in the United States age 13-64 (70% of Americans in that age range) played electronic games (2019). Consumers in the United States spent an estimated \$43.3 billion on e-gaming in 2018, double the \$21.5 billion spent just 5 years earlier in 2013 (Statista, 2020).

Additionally, viewing e-sports competitions online has grown to exceed traditional entertainment such as television, movies, and music. Global e-sports viewership is expected to grow at a 9% compounded annual growth rate (CAGR) between 2019 and 2023, from 454 million viewers in 2019 to 646 million in 2023. The growth of the e-sports viewing audience is on pace to nearly double over the six-year period from the 335 million viewers in 2017. A separate study estimates 2019 global revenue for spectator e-sports at \$196 billion (Jones, 2020), a figure that exceeds the combined revenues of video streaming on demand (e.g., Netflix, Hulu) at \$50.2 billion (Statista, 2020), global movie box office revenue at \$43 billion (Jones, 2020) and global recorded music at \$20.2 billion (IFPI, 2020).

Games – electronic or otherwise – can offer substantial social and intellectual development benefits to players, including: forming new friendships for emotionally shy individuals (Kowert, Domahidi and Quandt, 2014); development of moral reasoning (Hodge, Taylor and McAlany, 2020); recovery from lower back pain (France and Thomas, 2018); improvement in motor function for individuals with cerebral palsy (improvements in arm function, hand coordination, functional mobility, balance and gait function, postural control, upper-limbs function) and physical activity (Lopes, et al., 2018). Additionally, numerous

rehabilitation technology companies offer game-based solutions for rehabilitation for stroke (RecoVR, Flint Rehabilitation), cognitive development (Lumosity, Intendu, NeuronUp), executive function (The Learning Corp/Constant Therapy), gross motor training and math learning for children with developmental disabilities (Zyrobotics), and more.

To be sure, electronic games are not uniformly positive in their effects on players. Numerous studies have investigated “internet gaming disorder”, a disorder defined in the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders (DSM–5) and characterized by “persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinically significant impairment or distress” (Feng, et al., 2017; van den Eijnden, et al., 2018). Overuse of gaming, social media and other electronic technology can lead to serious deleterious psychosocial effects. Still, positive developmental, social, intellectual, and emotional effects are also recognized by researchers. These effects can result from games other than those considered “serious games”, which are commonly understood as ‘any piece of software that merges a non-entertaining purpose (seriousness) with a video game structure (game)’ (Djaouiti, et al., n.d.). Electronic gaming’s positive effects make it critical that people with disabilities have access to these products and services. Furthermore, gaming and gaming platforms have grown in sophistication to include multi-party text, video and voice chat, which enhances the social participation opportunities for players.

To date, little research has been conducted on game playing and spectating by people with disabilities. Researchers at the University of York in the United Kingdom and AbleGamers Charity in the United States surveyed participants recruited mainly from their respective network (Beeston, et al., 2018). They found that among the 230 participants in their sample, most identified themselves as gamers (150) and considered gaming to be their primary hobby (138).

About equal numbers self-identified as hardcore gamers and casual gamers. Single-player games were the type most frequently played, but multiplayer online games were also frequently played. Only 33 participants indicated that they did not play any online multiplayer games compared to 82 who said they did not play local (co-located) multiplayer games. Respondents indicated they play for multiple reasons, including having fun, to relax, be part of a community and other reasons.

Methods

Survey data were collected from August 27 to October 6, 2020 using convenience sampling. Participants were recruited via the Consumer Advisory Network (CAN) and the Accessibility User Research Collective (AURC), both maintained by researchers in the Rehabilitation Engineering Research Center for Community Living, Health and Function (LiveWell RERC) at Shepherd Center, a rehabilitation hospital in Atlanta, Georgia. All members of these U.S.-based national networks of people with disabilities are 18 years or older and report having a disability or functional limitation. It was not necessary to play electronic games to participate in the survey, but the substantive focus of the study may have skewed sampling in favor of people who play electronic games.

All participants completed the questionnaire online, even though our recruitment messages invited participants to call the study team if they wished to have assistance via voice communication. Survey Monkey served as the data collection platform. The study team has previously tested the screen-reader accessibility of Survey Monkey and found that most types of questions are screen-readers accessible, with the main exception being “grid” style questions asking respondents to rate multiple options within the same question. This style of question was not included in the questionnaire.

The questionnaire has several sections:

- Demographics, disability, and technology profile
- Gaming activities
- eSports viewing
- Video games and rehabilitation
- Social interactions

Demographic and disability profile and overall participation in electronic gaming for the sample are presented in Table 1. While demographic variables are not used in our statistical analyses for this paper, the statistics are included to provide an overview of study representation.

Table 1. Demographic and Study Variable Summary Statistics (N=402)

Demographics	Statistics
Mean age in years (standard deviation)	46.59 (sd=14.91)
Sex (Female %)	49.9%
Marital status (Married %)	41.1%
Race (Non-White %)	29.9%
Education (minimum Bachelors degree)	65.5%
Plays Video Games	58.8%

Data: Survey on Video Gaming, eGaming and eSports, 2020.

The disability types represented in our sample are summarized in Table 2. The questionnaire developed for this survey research project included 17 distinct functional limitations. However, it was impractical to provide analysis for all these limitations in this article. Instead, we focused on disabilities most related to ICT access. Most people reported having more than one disability or functional limitation. The questionnaire was designed to allowed multiple responses to questions on self-identified disabilities. This is reflected in the percentages in Table 2, which add to 155.6%.

Table 2. Disability Types of Sample (n= 402)

Disability Type	Percent of sample
Learning Disability	18.5%
Anxiety	22.6%
Speaking Limitation	6.6%
Upper Extremity Limitation	22.0%
Walking Limitation	29.2%
Fatigue & Limited Stamina	23.1%
Blind	29.2%
Deaf	4.4%

Source: Survey on Video Gaming, eGaming and eSports, 2020.

Analysis

The relationship between disability type and video game playing was tested using phi, (Φ ; Fleiss and Berlin, 2009) to understand if respondents with a specific type of disability played video games at a higher percent than all other respondents with disabilities (Table 3).

Respondents with learning disabilities reported playing video games at high levels (81%) and were significantly more likely to play video games than respondents who did not have a learning disability ($\Phi= 0.225$, $p<.001$). Statistically significant patterns also exist for respondents with anxiety (72.8%, $\Phi= 0.162$, $p<.01$); and limitations with fatigue and limited stamina (69.5%, $\Phi= 0.126$, $p<.05$). People who are blind were significantly less likely to play video games (46.9%, $\Phi= -0.161$, $p<.01$). For all other disability types reported in Table 3, there was not a significant difference in video game use, either marginally or with traditional cut-off values.

Table 3. Electronic Game Playing and Disability Type

Disability Type	Disability?	Plays video games – No	Plays video games – Yes	N	Φ	Significance
Learning Disability	No	46.7%	53.3%	338	.225	p<.001
	Yes	19.0%	81.0%	84		

Disability Type	Disability?	Plays video games – No	Plays video games – Yes	N	Φ	Significance
Anxiety	No	45.8%	54.2%	319	.162	p<.01
	Yes	27.2%	72.8%	103		
Speaking Limitation	No	41.8%	58.2%	392	.044	*
	Yes	33.3%	66.7%	30		
Upper Extremity Limitation	No	42.9%	57.1%	322	.059	*
	Yes	36.0%	64.0%	100		
Walking Limitation	No	41.2%	58.8%	289	-.002	*
	Yes	41.4%	58.6%	133		
Fatigue & Limited Stamina	No	44.8%	55.2%	317	.126	p<.05
	Yes	30.5%	69.5%	105		
Blind	No	36.0%	64.0%	292	-.161	p<.01
	Yes	53.1%	46.9%	130		
Deaf	No	41.3%	58.7%	402	.909	*
	Yes	40.0%	60.0%	20		

*p \geq 0.10

Source: Survey on Video Gaming, eGaming and eSports, 2020.

Respondents were asked to identify their favorite type of electronic game (Table 4). Each cell reports the percent of respondents with specific disability for whom each of the 12 electronic game types is their favorite. Overall, the favorite type of game by all respondents with any type of disability is word games (26.7%). There are notable differences between disability types. For example, blind participants identified “other games” (those not listed among the responses) as their favorite type of game (28.1%), followed by word games (24.6%), and role-playing and action games (each by 8.8% of blind respondents). In contrast, people who are deaf preferred role-playing games at the same rate as their preference for word games (25%), the highest rate for this group. Deaf respondents reported that their third favorite game type was action games (16.7%). A substantial percentage of respondents with a learning disability or anxiety also identified role playing games as their preferred game type (13.6% and 16.4%, respectively) after word games and “other” games. Action and adventure games receive the most attention in commercial advertisements, especially on television. Notably, respondents with speaking

limitations were the most likely to identify these games as their favorite (25% for both types combined), followed by those with a learning disability (21.2%), those who are deaf (16.7%), those with anxiety (15%) and those with fatigue and limited stamina (14.5%).

The least favorite type of games are exergames (0.4%) and virtual reality (0.7%). For exergames, only a small percentage of people who are blind (3.5%) identified exergames as their favorite. Exergames were not identified by any other disability type as their favorite. For virtual reality games a small percentage of respondents who have walking limitations (2.7%), learning disabilities (1.5%), and fatigue and limited stamina (1.4%) identified these as their favorite types of games. The low popularity of VR games might be a result of the higher cost for additional devices, accessories, and the games themselves.

We were also interested in the social aspects of gaming. Table 5 shows with whom respondents play electronic games, by disability type. Respondents were asked to identify each group of people with who they play. Rows do not sum to 100.0%, as respondents were asked to identify all that apply. Overall, respondents play electronic games by themselves most frequently (38.3%). Those with a learning disability are most likely to play alone (47.6%), followed by those with upper extremity limitation (45%), and those with fatigue and limited stamina (44.8%).

When playing games with others, respondents overall play most frequently with people they met online (27.1%) or with friends (27.0%). Playing with friends was most common for people who report having anxiety (36.9%), deafness (35.0%), or a learning disability (34.5%). Notably, people with either a speaking limitation or a physical/mobility limitation report playing with people they met online more frequently than with friends. Playing with acquaintances met online is most common for respondents with a speaking limitation (33.3%) and respondents who are deaf (30.0%), two functional limitations which might be related.

Table 4. Favorite Electronic Game Types and Disability Type

Disability Type	Action	Adventure	Battle Royale	Racing	Role Playing	Simulation	Strategy	Sports	Online massive multiplayer	Exergame	Virtual Reality	Word Games	Other	N
Learning Disability	10.6%	10.6%	1.5%	7.6%	13.6%	1.5%	3.0%	3.0%	6.1%	0.0%	1.5%	25.8%	15.2%	66
Anxiety	8.2%	6.8%	4.1%	4.1%	16.4%	1.4%	5.5%	2.7%	4.1%	0.0%	0.0%	28.8%	17.8%	73
Speaking Limitation	15.0%	10.0%	0.0%	0.0%	5.0%	0.0%	5.0%	0.0%	5.0%	0.0%	0.0%	30.0%	30.0%	20
Upper Extremity Limitation	8.1%	4.8%	0.0%	8.1%	16.1%	1.6%	9.7%	1.6%	8.1%	0.0%	0.0%	21.0%	21.0%	62
Walking Limitation	6.7%	5.3%	0.0%	6.7%	9.3%	1.3%	6.7%	5.3%	9.3%	0.0%	2.7%	28.0%	18.7%	75
Fatigue & Limited Stamina	8.7%	5.8%	0.0%	5.8%	10.1%	1.4%	2.9%	1.4%	8.7%	0.0%	1.4%	30.4%	23.2%	69
Blind	8.8%	1.8%	1.8%	1.8%	8.8%	1.8%	5.3%	7.0%	7.0%	3.5%	0.0%	24.6%	28.1%	57
Deaf	16.7%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	16.7%	0.0%	0.0%	25.0%	16.7%	12
Average	10.4%	5.6%	0.9%	4.3%	13.0%	1.1%	4.8%	2.6%	8.1%	0.4%	0.7%	26.7%	21.3%	--

Source: Survey on Video Gaming, eGaming and eSports, 2020.

Playing with family members (13.9%) and video game leagues (2.1%) are the least common types gaming partners/scenarios. Playing with family is most frequently reported by respondents with anxiety (21.4%), a speaking limitation (20.0%) or fatigue limited stamina (20.0%). Respondents with speaking limitations are the most active players in leagues (6.7%), followed by those who are deaf (5.0%), have upper extremity limitation (5.0%) or have fatigue/limited stamina (4.8%). As league play grows in popularity and becomes more accessible, the rate of participation by people with disabilities might grow.

Table 5. Electronic Gaming Partners and Disability Type (%)

Disability Type	Plays Alone	With Friends	Family	People Met Online	League Play	Other
Learning Disability	47.6%	34.5%	17.9%	28.6%	1.2%	3.6%
Anxiety	40.8%	36.9%	21.4%	28.2%	2.9%	2.9%
Speaking Limitation	40.0%	20.0%	20.0%	33.3%	0.0%	6.7%
Upper Extremity Limitation	45.0%	21.0%	13.0%	27.0%	2.0%	5.0%

Disability Type	Plays Alone	With Friends	Family	People Met Online	League Play	Other
Walking Limitation	38.3%	21.8%	15.0%	22.6%	2.3%	3.0%
Fatigue/Limited Stamina	44.8%	22.9%	20.0%	27.6%	3.8%	4.8%
Blind	27.1%	24.1%	12.0%	19.5%	1.5%	0.8%
Deaf	25.0%	35.0%	15.0%	30.0%	5.0%	5.0%
Average	38.6%	27.0%	16.8%	27.1%	2.3%	4.0%

Source: Survey on Video Gaming, eGaming and eSports, 2020.

Finally, knowing why people with disabilities play electronic games is critical to understanding motivation and behaviors. Table 6 shows responses for all participants, who were asked to select all reasons for playing that apply. An overwhelming majority (91.5%) said they play electronic games for entertainment or fun. Approximately three-fifths of respondents said they play to take a break from reality (62.1%) or to reduce stress (59.7%). Slightly less than half of the respondents said they play for social activity (44.0%).

Notably, few respondents said they play for training/skill building (11.7%), physical activity/exercise (10.5%), education (8.9%) or rehabilitation (6.5%). These results are consistent with the low numbers of respondents who report playing exercise games. It also suggests that rehabilitation professionals (clinical, engineering and research) might expect substantial challenges engaging people with disabilities in games by emphasizing functional improvement or training. This challenge might be especially difficult for games that are specifically designed for rehabilitation and recovery/maintenance of function. Our survey results instead point to the inherently therapeutic and immersive nature of electronic games versus games designed specifically as therapy. Instead of “gamification” of therapy, it might be more effective to consider gaming as therapy.

Table 6. Reason for Playing Electronic Games

Reason	N	%
Entertainment or fun	227	91.5%
Take a break from reality	154	62.1%
Reduce stress	148	59.7%
Social activity	109	44.0%
Art/aesthetic experience	40	16.1%
Competitive experience	32	12.9%
Training and simulated skill building	29	11.7%
Physical activity/exercise	26	10.5%
Education	22	8.9%
Rehabilitation or tele-rehab	16	6.5%
Other	16	6.5%

Source: Survey on Video Gaming, eGaming and eSports, 2020.

Conclusion

This exploratory research study is the first step in mapping the electronic gaming terrain for people with disabilities. Our data show that a substantial number of people with disabilities participate in e-gaming. But overall, they play electronics games mostly alone, they do not play primarily for social engagement and do not play to enhance or maintain functional performance or ability. In the end, people with disabilities just play to have fun, take a break from reality and reduce stress. Our survey data also show that some variation in the gaming experiences and preferences among people with specific disabilities do exist. Ongoing inquiry and analysis of our survey results will provide additional insights going forward.

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