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Video Game Trends Over Time for People with Disabilities

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Abstract

This study examines patterns of recreational video gaming from 2017-2021 for adults with disabilities. Analysis of video gaming trends was completed using data from a self-administered online survey of US Adults with disabilities (N=1,106) to understand patterns of gaming across disability types and demographic groups. 45.9% of respondents play video games. Of respondents who play video games, 62.4% play on a console, 68.4% play on their phone, and 57.9% play on their computer. People in three disability groups play video games more than people who have different disabilities: people with anxiety, people who have upper extremity limitations, and people with fatigue and limited stamina. Conversely, people who have limitations seeing or are blind play video games less than people with other types of disabilities. Males and younger adults with disabilities report playing video games less than females and older adults with disabilities. People with a graduate degree report playing video games less than people with lower levels of education.

Keywords

Video games, disability, gaming over time, video games and disability

Introduction

Video games are ubiquitous in the United States (U.S.). A substantial majority of adults in the United States (67%) play video games (2021 Essential Facts: About the Video Game Industry). Among those who play video games in the general population, 57% reported playing games on their smartphones, 46% on dedicated consoles, and 42% on their personal computer. Mobile gaming has gained significant popularity worldwide, representing a larger market share than console and PC gaming combined (State of Mobile Gaming). Casual games like Tetris, Among Us, and Candy Crush were by far the most popular genre of game (2021 Essential Facts: About the Video Game Industry; Leading Video Game Types Worldwide 2021).

Making video games accessible has been a notable focus for game developers (Brown and Anderson 702). Organizations like The AbleGamers Charity have worked to identify barriers to accessibility in video games and create resources for video game developers to make their games more inclusive (Cairns et al. 65). Some game developers have begun to integrate more accessibility settings geared toward players with specific disability types. For example, the creators of *The Last of Us Part II* included settings that would allow players who were blind or had low vision to navigate towards objectives or objects using sonar like audio cues (Link). In recent years, efforts have also been made to make gaming platforms themselves more accessible. In 2018, Microsoft released the Xbox Adaptive Controller, allowing players with more significant motor limitations to create their own custom solutions for gaming access (Gajanan). Despite these technological advances, however, disabled gamers continue to lack equitable access to mainstream video games.

While research has examined the use of video games as therapy for people with disabilities (Banskota and Ng; Hocking et al. 770) fewer studies have examined general patterns

of gaming for people with disabilities (Thompson, et al. 157). A qualitative study by Cairns et al. (262) indicated that motivations for individuals with disabilities to engage in gaming may extend beyond addressing therapeutic or rehabilitation goals. This study found motivating benefits of recreational gaming included feelings of enablement and social connection. Tabacof and colleagues (1202) explored the effect of introducing individuals with spinal cord injuries to eSports and providing them with the adaptive tools needed to access these games. Participants in this study reported increased feelings of social connectedness and decreased isolation when engaging in mainstream gaming.

To support the efforts to make mainstream gaming more accessible for all, it is important to establish a better understanding of the trends, platform preferences, and demographic characteristics of gamers with disabilities. Thus, this study examines patterns of recreational gaming from 2017-2021 for adults with disabilities.

Data and Methods

Data were collected from August 2017-August 2021 via the online self-administered entry survey of the Accessibility User Research Collective (AURC). The AURC is managed by researchers at Shepherd Center. Membership requirements include self-identifying as having a disability or functional limitation, being 18 or older, and living in the United States of America. A total of 1,106 AURC members' data are analyzed in this study.

Disability is measured with a series of seven dichotomous indicators: anxiety, dexterity limitation, walking limitation, fatigue and limited stamina, learning disability, low vision and blind, as well as low hearing and deaf. Respondents self-identified into disability groups. Most disability categories are measured through a single response option to the question *"Which, if any, of the following challenges or limitations do you have?"*: anxiety via *"frequent worrying,*

nervousness, or anxiety", walking limitation via *"difficulty walking or climbing stairs"*, fatigue and limited stamina via *"difficulty with fatigue/limited stamina"*, learning disability via *"difficulty learning, or a learning disability"*, low vision and blind via *"difficulty seeing"*, and low hearing and deaf via *"difficulty hearing"*. Dexterity limitation was measured by collapsing response options from *"difficulty using your arms"* and/or *"difficulty using your hands and fingers"* to the aforementioned question.

Demographic measures include sex, race, ethnicity, education, and age. Sex is measured through a single indicator of *"What is your sex?"* on the screener used from 2017-2020 and *"What is your gender?"* on the screener used from 2020-2021. Race and ethnicity are measured through a check all that apply question of *"What is your race/ethnicity?"*. Education is measured through a single indicator of *"What is the highest level of education you have completed?"*. Age is measured by taking the respondent's answer to *"What year were you born?"* from the year that they completed the screener.

Gaming measures include playing video games and gaming platforms. *Playing video games* is measured via a single indicator, "Do you play video games?" and their response options were yes and no. *Gaming platforms* are measured through collapsing a series of variables. Respondents were asked *"Which of the following platforms do you play video games?"* with a myriad of response options. For computer games, respondents who identified playing games on a Mac, games on a PC, and/or games played online via a web browser were coded as a 1 and all other respondents were coded as a 0. For phone games, respondents who identified playing games on an Android mobile phone and/or Apple iPhone were coded as a 1 and all other respondents were coded as a 0. For platform games, respondents who identified playing games on a Nintendo, Super Nintendo, Nintendo 64, Nintendo Wii, Nintendo Wii U, Nintendo Switch,

Nintendo Gameboy, Nintendo DS, PlayStation 1, PlayStation 2, PlayStation 3, PlayStation 4, PlayStation Portable, PlayStation Vita, Xbox, Xbox 360, and/or Xbox One were coded as a 1 and all other respondents were coded as a 0.

Analyses within this study include descriptive statistics, $\chi 2$ (chi-squared) for testing statistically significant differences between groups, Φ (phi) for testing the relationship between dichotomous measures (Fleiss and Berlin 239), and Γ (gamma) for testing the relationships between ordinal variables (Frankfort-Nachmias and Leon-Guerrero 385). Descriptive statistics used include percent (%) and count (N). Pearson's product moment chi-squared is used in this analysis as the data are parametric and the sample size is large enough to support the assumptions of the chi-squared. Analyses are conducted using pair-wise deletion as there are item non-response on some study measures (Weaver and Maxwell 145). For all statistical analyses, p values below 0.05 are reported as statistically significant (Frankfort-Nachmias and Leon-Guerrero 358).

Analysis

Table 1 includes descriptive statistics of all study variables. 45.9% of respondents play video games. Of respondents who play video games, 62.4% play on a console, 68.4% play on their phone, and 57.9% play on their computer. There is notable variation across the percent of respondents who have different types of disabilities: anxiety 20.9%, dexterity limitation 18.5%, walking limitation 23.3%, fatigue and limited stamina 17.9%, learning disability 22.2%, low vision and blind 41.6%, and low hearing and deaf 16.7%. Slightly less than half (41.6%) of respondents are female. 72.0% of respondents are white, 10.0% are African American, and 7.2% are Hispanic. Overall respondents are well educated: 9.4% highest education level was a high school diploma or less, 21.9% with some college (no degree), 7.5% Associate degree, 34.4%

Bachelor's degree, and 26.7% Graduate degree respectively. Age of respondents varies with an average age of 44.99 (SD=15.53) with 17.5% being 29 and younger, 24.5% being 30-39, 20.8% are 40-49, 16.3% are 50-59, and 20.9% are 60 are older. Respondents could have joined the study anytime between 2017 and 2021. 23.9% joined the AURC in 2017, 34.7% joined in 2018, 8.8% in 2019, 23.7% in 2020, and 9.0% in 2021.

Table 1. Study Variable Summary Statistics (N=1,106). Source: AURC, 2017-2021.

*Of participants who are gamers

Study Variable	**Percent**	**N**
Plays Video Games (Yes)	45.9%	503
Gaming Platform: Console	62.4%	314*
Gaming Platform: Phone	68.4%	344*
Gaming Platform: Computer	57.9%	291*
Disability Type: Anxiety	20.9%	231
Disability Type: Dexterity limitation	18.5%	205
Disability Type: Walking limitation	23.3%	258
Disability Type: Fatigue and limited stamina	17.9%	198
Disability Type: Learning disability	22.2%	245
Disability Type: Low vision and blind	41.6%	458
Disability Type: Low hearing and deaf	16.7%	185
Sex (Female)	45.2%	500
Race and Ethnicity: White	69.8%	772
Race and Ethnicity: African American	9.1%	101
Race and Ethnicity: Hispanic	5.3%	59
Race and Ethnicity: Other	15.7%	174
Education: High school diploma or less	9.4%	98
Education: Some college, no degree	21.9%	230
Education: Associate degree	7.5%	79
Education: Bachelor's degree	34.4%	361
Education: Graduate degree	26.7%	280
Age: 29 and younger	17.5%	182

Study Variable	Percent	N
Age: 30 – 39	24.5%	255
Age: 40 – 49	20.8%	216
Age: 50 – 59	16.3%	169
Age: 60 and older	20.9%	217
Year: 2017	23.9%	264
Year: 2018	34.7%	384
Year: 2019	8.8%	97
Year: 2020	23.7%	262
Year: 2021	9.0%	99

Figure 1 reflects the percent of people who said they play video games each year. While 45.9% of all respondents play video games, this percent varies year to year with 46.2% in 2017, 38.3% in 2018, 67.0% in 2019, 50.0% in 2020, and 43.4% in 2021.

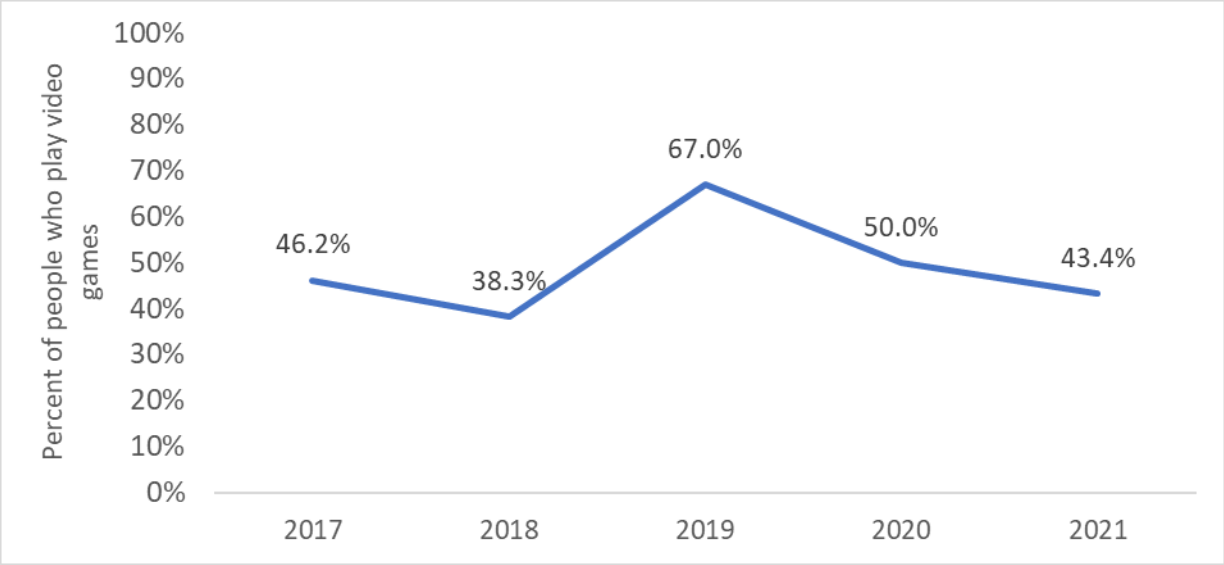

Fig. 1. Percent of Respondents with Disabilities Who Play Video Games by Year.

(Source: AURC, 2017-2021)

Figure 2 plots the percentage of respondents who are gamers for each year by disability type. All disability groups have a small decrease in gamers from 2017 to 2018. Akin to figure 1,

there is a notable peak from 2018 to 2019 with an increase for most disability groups. Testing of variability between disability groups each year is reported in table 2.

Table 2. Video Game Playing and Disability Type by Year. (Source: AURC, 2017-2021)

Disability Type	**Year**	**Φ**	**p value**	**Significance**
Learning Disability	**Overall**	**0.046**	**0.128**	
Learning Disability	2017	0.063	0.304	
Learning Disability	2018	-0.082	0.109	
Learning Disability	2019	0.163	0.108	
Learning Disability	2020	0.075	0.233	
Learning Disability	2021	0.169	0.093	
Anxiety	**Overall**	**0.110**	**<0.001**	**p<0.001**
Anxiety	2017	0.085	0.167	
Anxiety	2018	0.048	0.342	
Anxiety	2019	0.049	0.627	
Anxiety	2020	0.215	<0.001	p<0.001
Anxiety	2021	0.072	0.471	
Upper Extremity Limitation	**Overall**	**0.075**	**0.013**	**p<0.05**
Upper Extremity Limitation	2017	0.163	0.008	p<0.01
Upper Extremity Limitation	2018	0.070	0.172	
Upper Extremity Limitation	2019	-0.295	0.004	p<0.01
Upper Extremity Limitation	2020	-0.009	0.882	
Upper Extremity Limitation	2021	0.194	0.053	
Walking Limitation	**Overall**	**0.046**	**0.130**	
Walking Limitation	2017	0.125	0.042	p<0.05
Walking Limitation	2018	0.043	0.405	
Walking Limitation	2019	-0.340	<0.001	p<0.001
Walking Limitation	2020	-0.027	0.666	
Walking Limitation	2021	0.150	0.136	
Fatigue and Limited Stamina	**Overall**	**0.089**	**0.003**	**p<0.01**
Fatigue and Limited Stamina	2017	0.086	0.164	
Fatigue and Limited Stamina	2018	0.019	0.703	
Fatigue and Limited Stamina	2019	0.087	0.394	
Fatigue and Limited Stamina	2020	0.125	0.047	p<0.05

Disability Type	Year	Φ	p value	Significance
Fatigue and Limited Stamina	2021	0.097	0.334	
Blind or Seeing Limitation	**Overall**	**-0.135**	**<0.001**	**p<0.001**
Blind or Seeing Limitation	2017	-0.033	0.596	
Blind or Seeing Limitation	2018	-0.215	<0.001	p<0.001
Blind or Seeing Limitation	2019	0.100	0.327	
Blind or Seeing Limitation	2020	-0.200	0.002	p<0.01
Blind or Seeing Limitation	2021	0.094	0.351	
Deaf or Hearing Limitation	**Overall**	**0.015**	**0.624**	
Deaf or Hearing Limitation	2017	0.049	0.425	
Deaf or Hearing Limitation	2018	0.054	0.286	
Deaf or Hearing Limitation	2019	0.166	0.103	
Deaf or Hearing Limitation	2020	-0.109	0.084	
Deaf or Hearing Limitation	2021	-0.110	0.273	

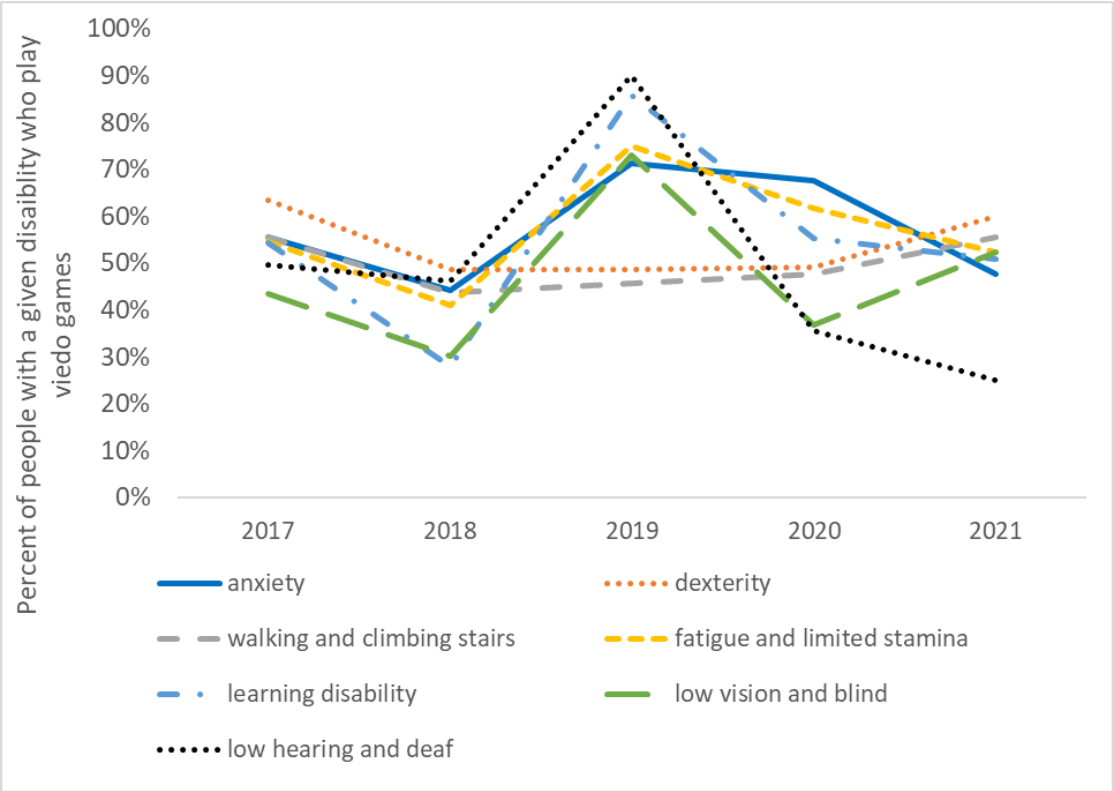

Fig. 2. Percent of Respondents by Disability Group Who Play Video Games by Year.

(Source: AURC 2017-2021)

Table 2 includes analysis of gaming by disability type for both overall and by year. For people with learning disabilities, respondents were not significantly more or less likely to play video games than people with other types of disabilities. Overall, people in three disability groups play video games more than people who do not have that disability type: people with anxiety (Φ= 0.110, $p<0.001$), people who have upper extremity limitations (Φ=0.075, p=0.013), and people with fatigue and limited stamina (Φ=0.089, p=0.003). Conversely, people who have limitations seeing or are blind play video games less than people with other types of disabilities (Φ= -0.135, $p<0.001$). These relationships, however, are not consistently significant and not always consistent in direction across all years, indicating there is a likely influence of year on playing video games by disability type. For example, when examined overall, people with anxiety play video games more than people with other types of disabilities (Φ=0.110, $p<0.001$). That relationship, however, is present in the year-by-year analysis only for 2020 (Φ=0.215, $p<0.001$). People with walking limitations report playing video games more than other disability groups in 2017 (Φ= 0.125, p=0.042) but fewer than other disability groups in 2020 (Φ= -0.340, $p<0.001$).

Video Game Platforms

Of the respondents who played video games, 62.4% play on a console (e.g., Xbox, Nintendo), 57.9% play on a computer, and 68.4% play on a phone. To better understand the use of gaming platforms by respondents, we examined not only which platforms gamers play on as a dichotomy, we also examined the overlap of platform usage (Figure 4). Respondents who played video games most commonly played on phone, computers, and consoles (31.4%) followed by phone and computer (17.4%), console (14.2%), phone and console (13.8%), phone (10.4%), computer and console (7.2%), and computer (5.7%).

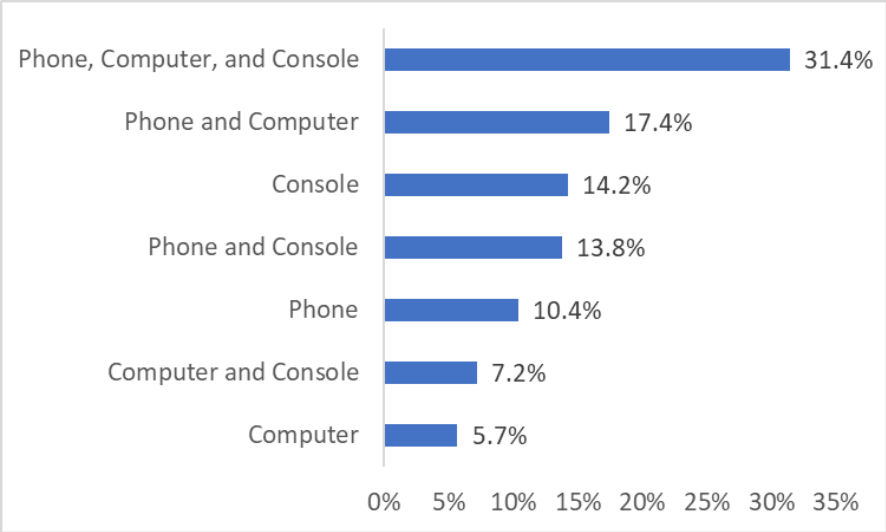

Fig. 3. Gaming Platforms Used by Respondents Who Play Video Games.

(Source: AURC, 2017-2021)

Video Game Playing and Demographic Measures

Males consistently identify as playing video games more than females. Overall, males significantly play games more than females ($\chi 2= 11.630$, $p<0.001$). These differences were also significant in the analysis for 2018 ($\chi 2=10.171$, $p=0.001$) and 2019 ($\chi 2=7.397$, $p=0.007$) data, but not for other years. While there is variation in the trends among race and ethnic groups, the differences are only not significant for 2018 ($\chi 2=8.510$, $p=0.037$) and 2021 ($\chi 2=141.28$, $p<0.001$). African Americans report playing video games more often than other race and ethnicity groups for 3 of the 5 years for which data were collected: 56.30% in 2018, 87.50% in 2019, and 86.40% in 2021. For age groups, there were significant differences across all years combined ($c=74.650$, $p<0.001$) as well as in 2017 ($\chi 2=21.179$, $p<0.001$), 2019 ($\chi 2=15.793$, $p=0.003$), and 2020 ($\chi 2=8.510$, $p=0.037$)=30.331, $p<0.001$). Overall, older people report playing video games at a lower percent than younger people.

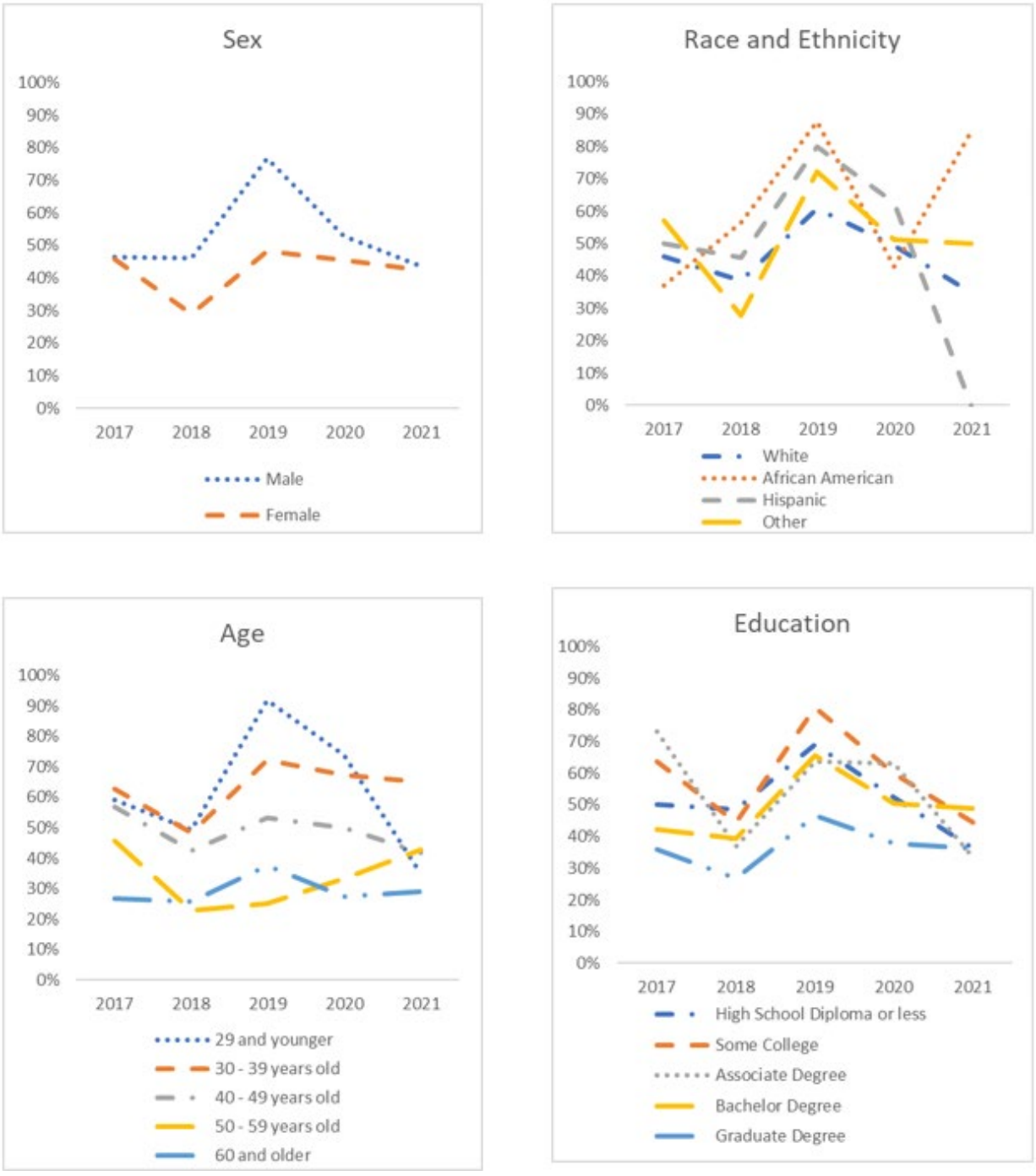

Fig. 4. Percent of People Who Play Video Games by Demographic Groups and Year.

(Source: AURC 2017-2021)

Discussion

This work can aid understanding of e-gaming among adults with disabilities over time. Nearly half (45.9%) of respondents reported playing video games. Males and younger adults with disabilities report playing video games less than females and older adults with disabilities. People with a graduate degree report playing video games less than people with lower levels of education. These demographic patterns reflect patterns of e-gaming participation in the general population. Variation in e-gaming participation by disability type requires additional inquiry to understand motivations, facilitators, and barriers to participation.

There is a notable amount of variability in gaming patterns for adults with disabilities. The percentage of respondents who played video games varied by year, with the highest percentage noted in 2019. Trends within disability and demographic categories were also heterogeneous when analyzed year by year. While variations in sampling probably contributed to some of this variability, the data suggests also that e-gaming activity may not be consistent or linear over time. The social and technological determinants of video-gaming activity over time should be investigated.

People with specific types of disabilities reported higher levels of gaming: anxiety, upper extremity limitations, as well as fatigue and limited stamina. These findings that individuals with upper extremity impairments and/or difficulty with stamina and fatigue have a higher likelihood of engaging in gaming is consistent with previous work (Thompson, et al. 157). They suggest that at least some disability groups are enjoying the social and personal benefits of gaming. The work of Tabacof and colleagues (1) found that the inclusion of individuals with SCI in eSports resulted in greater reported levels of social connectedness and feeling of enablement, which might explain higher levels of gaming for those with limited upper extremity use and stamina.

There is also a body of evidence of higher rates of gaming in those with anxiety. Multiple studies have demonstrated the positive effects of playing commercial video games for people with anxiety, including both prevention and reduction of anxiety symptoms (Kowal et al. 1).

Conversely, people with visual limitations are less likely to play video games. This could possibly be attributed to the relatively limited availability of accessibility features in mainstream video games for players who are blind or have very low vision. Some video games can be played by people with limited vision, including specialized audio games and fighting games like Mortal Kombat which rely on memorized input combinations rather than extensive navigation. Still, many popular games lack sufficient audio cues and other options to make them accessible for players who are blind or have low vision.

More gamers with disabilities reported gaming across all three primary categories of platforms (console, PC, mobile) than any other combination of platforms or any single platform. This suggests a need for developers to use a cross platform approach to improve accessibility of their products and increase inclusion of people with disabilities in mainstream gaming.

Year by year results should be interpreted cautiously due to factors that may have influenced the results of the yearly analysis. Convenience sampling was employed as results were obtained by analyzing the entry survey associated with the AURC database. The AURC conducts numerous studies each year, each with varying inclusion criteria. The substantive focus and number of studies completed each year can impact the characteristics – demographic breakdown, technology use (including video game playing), type of disability or functional limitation, etc. – of the full sample of individuals recruited to the database in that year. More in-depth qualitative research is needed to fully understand the patterns and preferences of disabled gamers. No clear predictable trends over time could be established by simple demographic

categories alone. Richer insights may be drawn from collecting additional data detailing the personal experiences of gamers with disabilities and how gaming has changed for users over time. It may be helpful to collect additional data on how changes in gaming software, hardware, peripherals, and the larger gaming industry may change the interaction experience and overall participation in gaming by people with disabilities.

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