Journal of Autism and Developmental Disorders
https://doi.org/10.1007/s10803-021-04994-x

BRIEF REPORT

Brief Report: Investigating the Motivations and Autistic Traits of Video Gamers

Elliot Millington[1] · **David R. Simmons**[1] · **Heather Cleland Woods**[1]

Accepted: 29 March 2021

Abstract

Video games are commonly of interest in autism, with autistic adolescents playing twice as much as their Typically Developing peers. The aims of this study are to investigate whether motivations to play video games measured using the Gaming Attitudes, Motivations and Experiences Scales and autistic traits using the Autism Spectrum Quotient can predict time spent playing video games. 57 participants were recruited from internet forums and completed an online questionnaire. The preliminary results revealed that only escapism and social motivation predicted time spent playing games. Further investigation revealed interactions between autistic traits and several motivational scales, including escapism, completionism, and customisation. This has consequences for future research into how autistic people use video games to ease their anxieties.

Keywords Autism · Video Games · Motivations · Escapism · Autistic Traits

Video games are a common pastime for autistic people, and especially for autistic adolescents (Cho et al., 2017). Investigations into video game usage find that up to 97% of autistic adolescents play video games (Durkin, 2010) compared to 85% of Typically Developing (TD) adolescents (Turner et al., 2012). These autistic adolescents have been shown to play significantly more each day than their TD counterparts (2.4 h vs 1.2 h, Kuo et al., 2014). As well as taking up a greater proportion of their free time (Engelhardt et al., 2017), autistic adults highlight that they struggle to disengage from video games to complete essential tasks (Mazurek & Engelhardt, 2013; Sundberg, 2018).

As a result of the strong interest in video games of many autistic individuals, researchers have attempted to study the impact of video games from a variety of perspectives. A prominent framework for examining the motivations of players is from Ryan et al. (2006) who applied self-determination theory (SDT; Deci & Ryan, 2017) to video games. According to this framework, the intrinsic motivation to play video games originates from the need to satisfy three basic psychological needs: competence, autonomy, and relatedness. A qualitative analysis of autistic adult gamers by Mazurek et al., (2015) found themes consistent with the SDT model of motivation, particularly across the competence domain. There has been limited quantitative work into the motivations of autistic gamers. Sundberg (2018) found that autistic gamers reported a higher desire for escapism, using video games as a means of escaping the real world, but were similar to TD gamers on all other sub-scales. Escapism has been linked to problematic gaming behaviour in both autistics and neurotypicals (Engelhardt et al., 2017), as well as generalised and social anxiety (Pang et al., 2017). That is not to say that the impact of video games is necessarily negative, with research from both TD and autistic populations showing that a healthy engagement can be fulfilling (Mazurek et al., 2015; Przybylski & Weinstein, 2017).

Autism is characterised by a complex constellation of features, which is best modelled as a hybridisation of dimensional and categorical traits (Elton et al., 2016). Various behavioural outcomes throughout the TD population have been found to vary with autistic traits, including social anxiety (Kleberg et al., 2017). Given that people with higher autistic traits are more prone to compulsive internet use (Finkenauer et al., 2012), it would be expected that a similar relationship would be found for video games.

The central questions of this paper are how the relationships between autistic traits and motivations for playing games influence playtime. The first prediction is that scales examining motivations for playing video games and

✉ David R. Simmons
David.Simmons@glasgow.ac.uk

[1] School of Psychology, University of Glasgow, 62 Hillhead Street, Glasgow G12 8QB, UK

Published online: 22 April 2021

autistic traits will be significantly predictive of total time playing video games. Secondly, it is expected that there will be interactions between autistic traits and the measures of motivation.

Methods

Measures

Participants reported how much time they spent playing video games in an average week. They were then asked to estimate what proportion of their time they spent playing alone, with strangers online, with friends they made online, and friends that they knew from real life.

The Gaming Attitudes, Motivations and Experiences Scales (GAMES; Hilgard et al., 2013) was developed as an instrument to study the risks of problematic gaming inspired by the work of Ryan et al., (2006). Participants use a 5-point Likert scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The scale contains 59 items that are split into nine subscales. These are story, violence catharsis, violent reward, social interaction, escapism, loss-aversion, customisation, completionism, and autonomy. This scale has been found to have high predictive validity and internal consistency (Hilgard et al., 2013).

The AQ (Baron-Cohen et al., 2001) measures the level of autistic traits expressed by an individual. The scale contains 50 items with 10 items for each of the five subscales: social skill, attention switching, attention to detail, communication, and imagination. Each item uses a 4-point agreement scale: definitely disagree, slightly disagree, slightly agree, definitely agree. For this analysis, the items were treated as a 4-point Likert scale.

Participants

A power analysis was conducted using the *pwr* R package before data collection for a multiple linear regression with ten predictors, a significance threshold of 0.05, a target power of 0.8, and an R^2 of 0.328 from Hilgard et al., (2013) which suggested a minimum of 42 participants. Data were then collected from 62 participants during January and February of 2019. The participants were recruited using Facebook, Reddit, and two autism emailing lists. There were no incentives offered for participation in the study. Participants were excluded if they were under the age of 16 or had a response rate of under 90% on any of the questionnaire sections. After the exclusion criteria had been applied, the sample consisted of 57 participants. Demographic information for these participants can be found in Table 1. 17 participants indicated that they had received a formal diagnosis of an autism spectrum disorder. Proof of diagnosis was not required from the participants. Specific data on socioeconomic status and ethnicity were not recorded. Informed consent was obtained before data collection. Ethical approval was granted by the University of Glasgow College of Science and Engineering Ethics Committee and the study was conducted in accordance with the Declaration of Helsinki.

Results

All variables representing time spent playing games were found to be significantly non-normally distributed using Shapiro–Wilk tests. This included total time played ($W = 0.78$, $p < 0.001$), time played alone ($W = 0.85$, $p < 0.001$), and time played socially ($W = 0.58$, $p < 0.001$). As such, it was decided to transform the data using a Tukey ladder of powers with a lambda of 0.45 (Tukey, 1957). After this transformation, the data were deemed approximately normal. The Cronbach's alpha was found to be 0.94 for the AQ and 0.92 for the overall GAMES questionnaire. Alphas for GAMES subscales can be seen in Table 2.

The first hypothesis of this study was that scores on the AQ and GAMES subscales would be predictive of the average total time playing video games. This prediction was tested using a multiple linear regression, the results of which can be found in Table 3 (adjusted $R^2 = 0.384$, $F(10, 36) = 3.86$, $p = 0.001$). The significant predictors of total time playing video games were the desires for socialising and escapism. Autistic traits did not significantly predict time spent playing games when controlling for motivational variables.

The second hypothesis was that interactions between AQ and GAMES scores would be significant. Analysis of the data revealed that AQ score was correlated with several of the GAMES measures, as can be seen in Table 4. A backwards stepwise algorithm was used to select the best model from an initial set of candidate predictors including the AQ, GAMES subscales, and interaction terms between the AQ and each of the GAMES subscales. The final model from this analysis is summarised in Table 5 (adjusted $R^2 = 0.460$, $F(15, 31) = 3.615$, $p = 0.001$). Interactions between AQ and escapism, customisation, and completionism were found to significantly contribute to this model.

Discussion

The overall aim of this report was to investigate how motivations to play video games and autistic traits interact to predict time spent gaming. The first hypothesis of this study was that the AQ and GAMES subscales would be predictive of the average time participants spent playing video games each day. The preliminary results of the multiple

Table 1 Demographic information of participants

Mean		Standard Deviation
Age	22.72	5.87
AQ score	24.65	11.14
Gender	N	
Female	17	
Male	33	
Non-binary	5	
Not provided	2	
Country of residence	N	
Australia	1	
Belgium	1	
Brazil	2	
Canada	1	
Chile	1	
Ireland	1	
Jordan	1	
Netherlands	1	
Sweden	1	
United Kingdom	31	
United States	9	
Not provided	2	

Table 2 Cronbach's alphas of GAMES subscales

Scale	Cronbach's alpha
Story	0.94
Violence catharsis	0.94
Violent reward	0.89
Social interaction	0.94
Escapism	0.89
Loss-aversion	0.83
Customisation	0.92
Completionism/Grinding	0.89
Autonomy	0.82

Table 3 Regression coefficients of AQ and GAMES effects on total time playing games

	B	*SE B*	β	*t*	p
AQ[a]	− 0.01	0.01	− 0.10	0.58	0.567
Story[b]	− 0.01	0.12	− 0.08	0.59	0.558
Violent Catharsis[c]	0.15	0.13	0.18	1.12	0.269
Violent Reward[d]	0.17	0.13	0.20	1.26	0.217
Social[e]	0.18	0.08	0.30	2.15	0.039*
Escapism[f]	0.39	0.16	0.45	2.41	0.021*
Loss Aversion[g]	− 0.07	0.17	− 0.06	0.42	0.679
Customisation[h]	0.00	0.12	0.00	0.03	0.980
Grinding[i]	− 0.06	0.10	− 0.07	0.56	0.579
Autonomy[j]	0.14	0.17	0.11	0.83	0.412

*$p < 0.05$

[a]A measure of autistic traits

[b]Extent to which stories in video games are engaging

[c]Using video game violence as a means of alleviating negative moods and aggression

[d]Using video game violence as a means of promoting positive moods

[e]Using video games as a tool for socialising with friends

[f]Using video games to escape from the everyday world

[g]Extent to which losing is frustrating

[h]Using video games to engage in creative activities

[i]Willingness to engage in repetitive in-game activities and/or complete every available option

[j]Enthusiasm for games with less linear gameplay and many options

linear regression model found that the social and escapism motivations were the only significant predictors of daily time spent playing, though the overall model accounted for 51.8% of the total variance. In our study, autistic traits were not found to be predictive of time spent playing games and if anything trended towards predicting less play. This finding contrasts with the prior body of research finding that autistic people play video games more than TD individuals (Kuo et al., 2014).

The second hypothesis investigated the role of autistic traits further, predicting that interactions between the AQ and GAMES subscales would be significant predictors of

Table 4 Correlations between time playing games, AQ, and GAMES

	AQ	Story	Catharsis	Violence	Social	Escapism	Losing	Custom	Grinding	Autonomy
Total play	0.18	0.28*	0.45***	0.32*	0.44***	0.47***	0.09	0.33*	0.09	0.31*
Alone[a]	0.21	0.30*	0.42**	0.24	0.26	0.52***	0.14	0.32*	0.16	0.29*
Friends[b]	− 0.04	0.25	0.38**	0.30*	0.69***	0.33*	− 0.13	0.34*	− 0.14	0.20*
AQ		0.07	0.29*	0.31*	− 0.17	0.52***	0.38**	0.24	0.34*	0.29*
Story			0.26	0.14	0.23	0.34*	0.06	0.45***	0.30*	0.23
Catharsis				0.48***	0.37**	0.47***	0.23	0.26	− 0.02	0.31*
Violence					0.31*	0.03	0.32*	0.11	0.11	0.19
Social						0.13	− 0.08	0.19	− 0.10	0.11
Escapism							0.25	0.40**	0.24	0.43**
Losing								0.28*	0.25	0.13
Custom									0.15	0.29*
Grinding										0.11

For descriptions of other headings, please refer to Table 3

*p < 0.05, **p < 0.01, ***p < 0.001

[a]Time spent playing games either alone or with strangers

[b]Time spent playing games with either online friends or real life friends

Table 5 Regression coefficients of AQ, GAMES, and subsequent interactions predicting total time playing games

	B	*SE B*	β	*t*	P
AQ	− 0.02	0.04	− 0.27	0.44	0.665
Violent catharsis	0.31	0.16	0.35	1.99	0.057†
Violent reward	− 0.46	0.38	− 0.58	1.22	0.232
Social	0.43	0.19	0.74	2.26	0.032*
Escapism	1.06	0.40	1.28	2.67	0.013*
Loss aversion	0.98	0.59	0.82	1.67	0.106
Customisation	− 0.75	0.39	− 0.95	1.94	0.062†
Grinding	− 0.73	0.30	− 0.96	2.46	0.020*
Autonomy	0.28	0.18	0.22	1.57	0.127
AQ × Violence	0.01	0.01	0.68	1.24	0.225
AQ × Social	− 0.01	0.01	− 0.49	1.45	0.158
AQ × Escapism	− 0.03	0.01	− 1.90	2.28	0.031*
AQ × Losing	− 0.04	0.02	− 1.36	2.28	0.079†
AQ × Custom	0.03	0.01	1.67	2.14	0.042*
AQ × Grinding	0.03	0.01	1.62	2.58	0.016*

For descriptions of headings, please refer to Table 3

*p < 0.05

†p < 0.1

video gameplay. The final model found three significant interactions between AQ and motivation, specifically escapism, customisation, and completionism. Levels of autistic traits themselves did not predict total time played. These results suggest that the relationship between autistic traits and playing games is more complex than a simple linear predictor. The most notable motive is escapism, which was found to be a significant predictor of time playing games. Escapism has a significant interaction with autistic traits and was moderately correlated with AQ scores. This finding complements existing literature reporting that an increased desire for escapism increases the risk of problematic gaming (Hilgard et al., 2013) and that escapism desire is raised in autistic groups (Sundberg, 2018).

These findings have interesting consequences for the study of intolerance of uncertainty within autism (Lidstone et al., 2014), a model connecting sensory sensitivities, intolerance of uncertainty, anxiety, and Restricted, Repetitive Behaviours (RRBs). There is a wide body of research connecting escapism with various measures of anxiety, mental health outcomes, and well-being (Pang et al., 2017). Given the prominence of video games as an RRB (Cho et al., 2017), all of the major concepts within the intolerance of uncertainty model are integrated within video gaming and its supporting academic literature.

This study is subject to several limitations. Feedback from autistic participants highlighted how they felt that their motivations for playing video games were not comprehensively covered by the GAMES questionnaire. Further, as the scales had been developed on a neurotypical population, several autism-specific characteristics were not included. Future research into this area should engage with the autistic community to develop more specific measures, in line with the guidelines developed by Fletcher-Watson et al. (2019).

The results of this exploratory study offer insights into the motivations of autistic gamers. This pilot study is the first to take a detailed look at the full battery of motivations and how these are expressed in specific gaming behaviours. Firstly, the success of the regression models for predicting

time spent playing video games would suggest that motivational theory can be successfully applied to autistic players. Secondly, rather than autistic traits being independent of these motivational desires, they instead influence their strength and expression.

Acknowledgment This study was partially supported by an Economic and Social Research Council (ESRC) collaborative studentship (funded with Sublime Digital Limited). Special thanks to Joseph Hilgard who gave us permission to use his Gaming Attitudes, Motivations, and Experiences Scales measure. We would also like to thank all our participants for taking part in this study and providing perceptive feedback. Finally, thank you to Professor Sue Fletcher-Watson and Sarune Savickaite for their insightful comments and discussion. Processed data and analysis scripts can be found at https://osf.io/x2m6f/.

Author Contributions EM, DRS, and HCW contributed to the design of the project and the drafting of the manuscript. EM and HCW implemented the data collection and analysis. EM took the lead on writing the manuscript.

Declarations

Conflicts of Interest This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

References

Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The autism-spectrum quotient (AQ): evidence from asperger syndrome/high-functioning autism, males and females, scientists and mathematicians. *Journal of Autism and Developmental Disorders, 31*(1), 5–17. https://doi.org/10.1023/A:1005653411471.

Cho, I. Y. K., Jelinkova, K., Schuetze, M., Vinette, S. A., Rahman, S., McCrimmon, A., & Bray, S. (2017). Circumscribed interests in adolescents with Autism spectrum disorder: A look beyond trains, planes, and clocks. *PLoS ONE, 12*(11), e0187414. https://doi.org/10.1371/journal.pone.0187414.

Deci, E. L., & Ryan, R. M. (2017). *Self-determination theory: Basic psychological needs in motivation development and wellness*. Guilford Publishing. https://doi.org/10.1097/TA.0b013e31827e1534.

Durkin, K. (2010). Videogames and young people with developmental disorders. *Review of General Psychology, 14*(2), 122–140. https://doi.org/10.1037/a0019438.

Elton, A., Di Martino, A., Hazlett, H. C., & Gao, W. (2016). Neural connectivity evidence for a categorical-dimensional hybrid model of autism spectrum disorder. *Biological Psychiatry, 80*(2), 120–128. https://doi.org/10.1016/j.biopsych.2015.10.020.

Engelhardt, C. R., Mazurek, M. O., & Hilgard, J. (2017). Pathological game use in adults with and without autism spectrum disorder. *PeerJ, 5*, e3393. https://doi.org/10.7717/peerj.3393.

Finkenauer, C., Pollmann, M. M. H., Begeer, S., & Kerkhof, P. (2012). Brief report: examining the link between autistic traits and compulsive internet use in a non-clinical sample. *Journal of Autism and Developmental Disorders, 42*(10), 2252–2256. https://doi.org/10.1007/s10803-012-1465-4.

Fletcher-Watson, S., Adams, J., Brook, K., Charman, T., Crane, L., Cusack, J., & Pellicano, E. (2019). Making the future together: Shaping autism research through meaningful participation. *Autism, 23*(4), 943–953. https://doi.org/10.1177/1362361318786721.

Hilgard, J., Engelhardt, C. R., & Bartholow, B. D. (2013). Individual differences in motives, preferences, and pathology in video games: The gaming attitudes, motives, and experiences scales (GAMES). *Frontiers in Psychology, 4*, 608. https://doi.org/10.3389/fpsyg.2013.00608.

Kleberg, J. L., Högström, J., Nord, M., Bölte, S., Serlachius, E., & Falck-Ytter, T. (2017). Autistic traits and symptoms of social anxiety are differentially related to attention to others' eyes in social anxiety disorder. *Journal of Autism and Developmental Disorders, 47*(12), 3814–3821. https://doi.org/10.1007/s10803-016-2978-z.

Kuo, M. H., Orsmond, G. I., Coster, W. J., & Cohn, E. S. (2014). Media use among adolescents with autism spectrum disorder. *Autism, 18*(8), 914–923. https://doi.org/10.1177/1362361313497832.

Lidstone, J., Uljarević, M., Sullivan, J., Rodgers, J., McConachie, H., Freeston, M., & Leekam, S. R. (2014). Relations among restricted and repetitive behaviors, anxiety and sensory features in children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 8*(2), 82–92. https://doi.org/10.1016/j.rasd.2013.10.001.

Mazurek, M. O., & Engelhardt, C. R. (2013). Video game use in boys with autism spectrum disorder, ADHD, or typical development. *Pediatrics, 132*(2), 260–266. https://doi.org/10.1542/peds.2012-3956.

Mazurek, M. O., Engelhardt, C. R., & Clark, K. E. (2015). Video games from the perspective of adults with autism spectrum disorder. *Computers in Human Behavior, 51*, 122–130. https://doi.org/10.1016/j.chb.2015.04.062.

Pang, S., Abdin, E., Chong, S. A., Chua, B. Y., Lee, S. P., Picco, L., & Subramaniam, M. (2017). Correlates of online game play motivations, social anxiety and psychological distress. *Annals of the Academy of Medicine Singapore, 46*(11), 443–446.

Przybylski, A. K., & Weinstein, N. (2017). A large-scale test of the goldilocks hypothesis: Quantifying the relations between digital-screen use and the mental well-being of adolescents. *Psychological Science, 28*(2), 204–215. https://doi.org/10.1177/0956797616678438.

Ryan, R. M., Rigby, C. S., & Przybylski, A. K. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion, 30*(4), 344–360. https://doi.org/10.1007/s11031-006-9051-8.

Sundberg, M. (2018). Online gaming, loneliness and friendships among adolescents and adults with ASD. *Computers in Human Behavior, 79*, 105–110. https://doi.org/10.1016/j.chb.2017.10.020.

Tukey, J. W. (1957). On the comparative anatomy of transformations. *The Annals of Mathematical Statistics, 28*(3), 602–632. https://doi.org/10.1214/aoms/1177706875.

Turner, N. E., Paglia-Boak, A., Ballon, B., Cheung, J. T. W., Adlaf, E. M., Henderson, J., & Mann, R. E. (2012). Prevalence of problematic video gaming among ontario adolescents. *International Journal of Mental Health and Addiction, 10*(6), 877–889. https://doi.org/10.1007/s11469-012-9382-5.