



Millington, E., Simmons, D. R. and Cleland Woods, H. (2022) Brief report: investigating the motivations and autistic traits of video gamers. *Journal of Autism and Developmental Disorders*, 52(3), pp. 1403-1407. (doi: [10.1007/s10803-021-04994-x](https://doi.org/10.1007/s10803-021-04994-x)).

This is the author's final accepted version.

There may be differences between this version and the published version. You are advised to consult the publisher's version if you wish to cite from it.

<http://eprints.gla.ac.uk/238153/>

Deposited on: 30 April 2021

Enlighten – Research publications by members of the University of Glasgow
<http://eprints.gla.ac.uk>

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

2

3 Elliot Millington¹, David R. Simmons¹, Heather Cleland Woods¹

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

5

Abstract

6
7 A common special interest in autism are video games, with autistic adolescents playing twice as
8 much as their Typically Developing peers. The aims of this study are to investigate whether
9 motivations to play video games measured using the Gaming Attitudes, Motivations and
10 Experiences Scales and autistic traits using the Autism Spectrum Quotient can predict time spent
11 playing video games. 57 participants were recruited from internet forums and completed an online
12 questionnaire. The preliminary results revealed that only the escapism and social motivation
13 predicted time spent playing games. Further investigation revealed interactions between autistic
14 traits and several motivational scales, including escapism, completionism, and customisation. This
15 has consequences for future research into how autistic people use video games to ease their
16 anxieties.

17 Keywords: Autism, Video Games, Motivations, Escapism, Autistic Traits

18 Corresponding Author: David Simmons – David.Simmons@glasgow.ac.uk, 01413303612

19 Conflict of Interest: The authors declare that they have no conflict of interest.

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

21 Video games are a common special interest for autistic people, and especially for autistic
22 adolescents (Cho et al., 2017). Investigations into video game usage find that up to 97% of autistic
23 adolescents play video games (Durkin, 2010) compared to 85% of Typically Developing (TD)
24 adolescents (Turner et al., 2012). These autistic adolescents have been shown to play significantly
25 more each day than their TD counterparts (2.4 hours vs 1.2 hours, Kuo, Orsmond, Coster, & Cohn,
26 2014). As well as taking up a greater proportion of their free time (Engelhardt, Mazurek, &
27 Hilgard, 2017), autistic adults highlight that they struggle to disengage from video games to
28 complete essential tasks (Mazurek & Engelhardt, 2013; Sundberg, 2018).

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

42 games is necessarily negative, with research from both TD and autistic populations showing that
43 a healthy engagement can be fulfilling (Mazurek et al., 2015; Przybylski & Weinstein, 2017)

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

50 The central questions of this paper are how the relationships between autistic traits and
51 motivations for playing games influence playtime. The first prediction is that scales examining
52 motivations for playing video games and autistic traits will be significantly predictive of total time
53 playing video games. Secondly, it is expected that there will be interactions between autistic traits
54 and the measures of motivation.

55 Methods

56 *Measures*

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

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

65 completionism, and autonomy. This scale has been found to have high predictive validity and
66 internal consistency (Hilgard et al., 2013).

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

72 *Participants*

73 A power analysis was conducted using the *pwr* R package before data collection for a
74 multiple linear regression with ten predictors, a significance threshold of .05, a target power of 0.8,
75 and an R^2 of 0.328 from Hilgard et al (2013) which suggested a minimum of 42 participants. Data
76 were then collected from 62 participants during January and February of 2019. The participants
77 were recruited using Facebook, Reddit, and two autism emailing lists. There were no incentives
78 offered for participation in the study. Participants were excluded if they were under the age of 16
79 or had a response rate of under 90% on any of the questionnaire sections. After the exclusion
80 criteria had been applied, the sample consisted of 57 participants. 17 participants indicated that
81 they had received a formal diagnosis of an autism spectrum disorder. Proof of diagnosis was not
82 required from the participants. Specific data on socioeconomic status and ethnicity were not
83 recorded. Informed consent was obtained before data collection. Ethical approval was granted by
84 the [X] Ethics Committee and the study was conducted in accordance with the Declaration of
85 Helsinki.

86 [Table 1 here]

87 Results

88 All variables representing time spent playing games were found to be significantly non-
89 normally distributed using Shapiro-Wilk tests. This included total time played ($W = 0.78, p <$
90 0.001), time played alone ($W = 0.85, p < 0.001$), and time played socially ($W = 0.58, p < 0.001$).
91 As such, it was decided to transform the data using a Tukey ladder of powers with a lambda of
92 0.45 (Tukey, 1957). After this transformation, the data were deemed approximately normal. The
93 Cronbach's alpha was found to be 0.94 for the AQ and 0.92 for the overall GAMES questionnaire.
94 Alphas for GAMES subscales can be seen in table 2.

95 [Table 2 Here]

96 The first hypothesis of this study was that scores on the AQ and GAMES subscales would
97 be predictive of the average total time playing video games. This prediction was tested using a
98 multiple linear regression, the results of which can be found in table 1 (adjusted $R^2 = 0.384,$
99 $F(10,36) = 3.86, p = 0.001$). The significant predictors of total time playing video games were the
100 desires for socialising and escapism. Autistic traits did not significantly predict time spent playing
101 games when controlling for motivational variables.

102 [Table 3 Here]

103 The second hypothesis was that interactions between the AQ and GAMES would be
104 significant. Analysis of the data revealed that the AQ was correlated with several of the GAMES
105 measures, as can be seen in table 2. A backwards stepwise algorithm was used to select the best
106 model from an initial set of candidate predictors including the AQ, GAMES subscales, and
107 interaction terms between the AQ and each of the GAMES subscales. The final model from this
108 analysis is summarised in table 3 (adjusted $R^2 = 0.460, F(15, 31) = 3.615, p = 0.001$). Interactions

109 between AQ and escapism, customisation, and completionism were found to significantly
110 contribute to this model.

111 [Table 4 Here]

112 [Table 5 Here]

113 Discussion

114 The overall aim of this report was to investigate how motivations to play video games and
115 autistic traits interact to predict time spent gaming. The first hypothesis of this study was that the
116 AQ and GAMES subscales would be predictive of the average time participants spent playing
117 video games each day. The preliminary results of the multiple linear regression model found that
118 the social and escapism motivations were the only significant predictors of daily time spent
119 playing, though the overall model accounted for 51.8% of the total variance. In our study, autistic
120 traits were not found to be predictive of time spent playing games and if anything trended towards
121 predicting less play. This finding, as well as the failure to find a significant difference between TD
122 and autistic/high-AQ groups in total time played, contrasts with the prior body of research finding
123 that autistic people play video games more than TD individuals (Kuo et al., 2014).

124 The second hypothesis investigated the role of autistic traits further, predicting that
125 interactions between the AQ and GAMES subscales would be significant predictors of video
126 gameplay. The final model found three significant interactions between AQ and motivation,
127 specifically escapism, customisation, and completionism. Levels of autistic traits themselves did
128 not predict total time played. These results suggest that the relationship between autistic traits and
129 playing games is more complex than a simple linear predictor. The most notable motive is
130 escapism, which was found to be a significant predictor of time playing games. Escapism has a
131 significant interaction with autistic traits and was moderately correlated with AQ scores. This

132 finding complements existing literature reporting that an increased desire for escapism increases
133 the risk of problematic gaming (Hilgard et al., 2013) and that escapism desire is raised in autistic
134 groups (Sundberg, 2018).

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

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

148 The results of this exploratory study offer insights into the motivations of autistic gamers.
149 This pilot is the first to take a detailed look at the full battery of motivations and how these are
150 expressed in specific gaming behaviours. Firstly, the success of the regression models for
151 predicting time spent playing video games would suggest that motivational theory can be
152 successfully applied to autistic players. Secondly, rather than autistic traits being independent of
153 these motivational desires, they instead influence their strength and expression.

154 *Conflicts of Interest*

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

157 *References*

- 158 Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The Autism-
159 Spectrum Quotient (AQ): Evidence from Asperger Syndrome/High-Functioning Autism,
160 Males and Females, Scientists and Mathematicians. *Journal of Autism and Developmental*
161 *Disorders*, 31(1), 5–17. <https://doi.org/10.1023/A:1005653411471>
- 162 Cho, I. Y. K., Jelinkova, K., Schuetze, M., Vinette, S. A., Rahman, S., McCrimmon, A., ... Bray,
163 S. (2017). Circumscribed interests in adolescents with Autism Spectrum Disorder: A look
164 beyond trains, planes, and clocks. *PLoS ONE*, 12(11), e0187414.
165 <https://doi.org/10.1371/journal.pone.0187414>
- 166 Deci, E. L., & Ryan, R. M. (2017). Self-Determination Theory: Basic Psychological Needs in
167 Motivation Development and Wellness. In *New York: Guilford Publishing*.
168 <https://doi.org/10.1097/TA.0b013e31827e1534>
- 169 Durkin, K. (2010). Videogames and Young People With Developmental Disorders. *Review of*
170 *General Psychology*, 14(2), 122–140. <https://doi.org/10.1037/a0019438>
- 171 Elton, A., Di Martino, A., Hazlett, H. C., & Gao, W. (2016). Neural Connectivity Evidence for a
172 Categorical-Dimensional Hybrid Model of Autism Spectrum Disorder. *Biological*
173 *Psychiatry*, 80(2), 120–128. <https://doi.org/10.1016/j.biopsych.2015.10.020>
- 174 Engelhardt, C. R., Mazurek, M. O., & Hilgard, J. (2017). Pathological game use in adults with
175 and without Autism Spectrum Disorder. *PeerJ*, 5, e3393. <https://doi.org/10.7717/peerj.3393>
- 176 Finkenauer, C., Pollmann, M. M. H., Begeer, S., & Kerkhof, P. (2012). Brief Report: Examining
177 the Link Between Autistic Traits and Compulsive Internet Use in a Non-Clinical Sample.
178 *Journal of Autism and Developmental Disorders*, 42(10), 2252–2256.
179 <https://doi.org/10.1007/s10803-012-1465-4>
- 180 Fletcher-Watson, S., Adams, J., Brook, K., Charman, T., Crane, L., Cusack, J., ... Pellicano, E.
181 (2019). Making the future together: Shaping autism research through meaningful
182 participation. *Autism*, 23(4), 943–953. <https://doi.org/10.1177/1362361318786721>
- 183 Hilgard, J., Engelhardt, C. R., & Bartholow, B. D. (2013). Individual differences in motives,
184 preferences, and pathology in video games: The gaming attitudes, motives, and experiences
185 scales (GAMES). *Frontiers in Psychology*, 4(SEP), 608.
186 <https://doi.org/10.3389/fpsyg.2013.00608>
- 187 Kleberg, J. L., Högström, J., Nord, M., Bölte, S., Serlachius, E., & Falck-Ytter, T. (2017).
188 Autistic Traits and Symptoms of Social Anxiety are Differentially Related to Attention to
189 Others' Eyes in Social Anxiety Disorder. *Journal of Autism and Developmental Disorders*,
190 47(12), 3814–3821. <https://doi.org/10.1007/s10803-016-2978-z>

- 191 Kuo, M. H., Orsmond, G. I., Coster, W. J., & Cohn, E. S. (2014). Media use among adolescents
192 with autism spectrum disorder. *Autism, 18*(8), 914–923.
193 <https://doi.org/10.1177/1362361313497832>
- 194 Lidstone, J., Uljarević, M., Sullivan, J., Rodgers, J., McConachie, H., Freeston, M., ... Leekam,
195 S. R. (2014). Relations among restricted and repetitive behaviors, anxiety and sensory
196 features in children with autism spectrum disorders. *Research in Autism Spectrum*
197 *Disorders, 8*(2), 82–92. <https://doi.org/10.1016/j.rasd.2013.10.001>
- 198 Mazurek, M. O., & Engelhardt, C. R. (2013). Video Game Use in Boys With Autism Spectrum
199 Disorder, ADHD, or Typical Development. *Pediatrics, 132*(2), 260–266.
200 <https://doi.org/10.1542/peds.2012-3956>
- 201 Mazurek, M. O., Engelhardt, C. R., & Clark, K. E. (2015). Video games from the perspective of
202 adults with autism spectrum disorder. *Computers in Human Behavior, 51*(PA), 122–130.
203 <https://doi.org/10.1016/j.chb.2015.04.062>
- 204 Pang, S., Abdin, E., Chong, S. A., Chua, B. Y., Lee, S. P., Picco, L., ... Subramaniam, M.
205 (2017). Correlates of online game play motivations, social anxiety and psychological
206 distress. *Annals of the Academy of Medicine Singapore, 46*(11), 443–446.
- 207 Przybylski, A. K., & Weinstein, N. (2017). A Large-Scale Test of the Goldilocks Hypothesis:
208 Quantifying the Relations Between Digital-Screen Use and the Mental Well-Being of
209 Adolescents. *Psychological Science, 28*(2), 204–215.
210 <https://doi.org/10.1177/0956797616678438>
- 211 Ryan, R. M., Rigby, C. S., & Przybylski, A. K. (2006). The Motivational Pull of Video Games:
212 A Self-Determination Theory Approach. *Motivation and Emotion, 30*(4), 344–360.
213 <https://doi.org/10.1007/s11031-006-9051-8>
- 214 Sundberg, M. (2018). Online gaming, loneliness and friendships among adolescents and adults
215 with ASD. *Computers in Human Behavior, 79*, 105–110.
216 <https://doi.org/10.1016/j.chb.2017.10.020>
- 217 Tukey, J. W. (1957). On the Comparative Anatomy of Transformations. *The Annals of*
218 *Mathematical Statistics, 28*(3), 602–632. <https://doi.org/10.1214/aoms/1177706875>
- 219 Turner, N. E., Paglia-Boak, A., Ballon, B., Cheung, J. T. W., Adlaf, E. M., Henderson, J., ...
220 Mann, R. E. (2012). Prevalence of Problematic Video Gaming among Ontario Adolescents.
221 *International Journal of Mental Health and Addiction, 10*(6), 877–889.
222 <https://doi.org/10.1007/s11469-012-9382-5>

223 Acknowledgment

224 This study was partially supported by an Economic and Social Research Council (ESRC)
225 collaborative studentship (funded with Sublime Digital Limited). Special thanks to Joseph Hilgard
226 who gave us permission to use his Gaming Attitudes, Motivations, and Experiences Scales
227 measure. We would also like to thank all our participants for taking part in this study and providing

228 perceptive feedback. Finally, thank you to Professor Sue Fletcher-Watson and Sarune Savickaite
229 for their insightful comments and discussion. Processed data and analysis scripts can be found at
230 <https://osf.io/x2m6f/>.

231 Tables

232 Table 1

233 *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	

234

235

236 Table 2

237 Cronbach's alphas of GAMES subscales

Scale	Cronbach's Alpha
<i>Story</i>	0.94
<i>Violence Catharsis</i>	0.94
<i>Violent Reward</i>	0.89
<i>Social Interaction</i>	0.94
<i>Escapism</i>	0.89
<i>Loss-Aversion</i>	0.83
<i>Customisation</i>	0.92
<i>Completionism/Grinding</i>	0.89
<i>Autonomy</i>	0.82

238

239 Table 3

240 *Regression coefficients of AQ and GAMES effects on total time playing games*

	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
AQ ^a	-0.01	0.01	-0.10	0.58	.567
Story ^b	-0.01	0.12	-0.08	0.59	.558
Violent Catharsis ^c	0.15	0.13	0.18	1.12	.269
Violent Reward ^d	0.17	0.13	0.20	1.26	.217
Social ^e	0.18	0.08	0.30	2.15	.039*
Escapism ^f	0.39	0.16	0.45	2.41	.021*
Loss Aversion ^g	-0.07	0.17	-0.06	0.42	.679
Customisation ^h	0.00	0.12	0.00	0.03	.980
Grinding ⁱ	-0.06	0.10	-0.07	0.56	.579
Autonomy ^j	0.14	0.17	0.11	0.83	.412

**p* < .05241 ^a A measure of autistic traits242 ^b Extent to which stories in video games are engaging243 ^c Using video game violence as a means of alleviating negative moods and aggression244 ^d Using video game violence as a means of promoting positive moods245 ^e Using video games as a tool for socialising with friends246 ^f Using video games to escape from the everyday world247 ^g Extent to which losing is frustrating248 ^h Using video games to engage in creative activities249 ⁱ Willingness to engage in repetitive in-game activities and/or complete every available option250 ^j Enthusiasm for games with less linear gameplay and many options

251

252 Table 4

253 *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

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

254 ^a Time spent playing games either alone or with strangers255 ^b Time spent playing games with either online friends or real life friends

256 For descriptions of other headings, please refer to table 1.

257

258 Table 5

259 *Regression coefficients of AQ, GAMES, and subsequent interactions predicting total time playing*
260 *games*

	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>P</i>
AQ	-0.02	0.04	-0.27	0.44	.665
Violent Catharsis	0.31	0.16	0.35	1.99	.057 [†]
Violent Reward	-0.46	0.38	-0.58	1.22	.232
Social	0.43	0.19	0.74	2.26	.032*
Escapism	1.06	0.40	1.28	2.67	.013*
Loss Aversion	0.98	0.59	0.82	1.67	.106
Customisation	-0.75	0.39	-0.95	1.94	.062 [†]
Grinding	-0.73	0.30	-0.96	2.46	.020*
Autonomy	0.28	0.18	0.22	1.57	.127
AQ x Violence	0.01	0.01	0.68	1.24	.225
AQ x Social	-0.01	0.01	-0.49	1.45	.158
AQ x Escapism	-0.03	0.01	-1.90	2.28	.031*
AQ x Losing	-0.04	0.02	-1.36	2.28	.079 [†]
AQ x Custom	0.03	0.01	1.67	2.14	.042*
AQ x Grinding	0.03	0.01	1.62	2.58	.016*

[†] p < 0.1, * p < 0.05

261 For descriptions of headings, please refer to table 1.