Emotional Stability Buffers the Link between Habitual Gaming and Negative Psychological Outcomes

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This study aims to assess whether frequent computer and video gaming necessarily leads to negative psychological outcomes, or if some people are at higher risk than others. Analysing a national probability adult sample (N=21,120), this study found that habitual gamers (≥5.0 hours/week) experienced increased psychological distress, reduced self-esteem, and poorer body satisfaction than non-gamers and casual gamers (.1-5.0 hours/week). Critically, consistent with general personality-diathesis models, habitual gaming was more strongly linked with psychological distress and self-esteem among gamers with low Emotional Stability. Personality did not moderate the link between gaming and body satisfaction. These findings document a classic personality x situation interaction in a large-scale national probability sample and identify a personality characteristic that predicts who may be at greater risk of negative outcomes linked with habitual gaming.

Keywords: *Emotional Stability; Habitual Gaming; Psychological Outcomes*

Introduction

Psychological research has established that video gaming is linked with both positive (Brand & Todhunter, 2017; Przybylski, Ryan, & Rigby, 2009; Russoniello, O'Brien, & Parks, 2009; Snodgrass, Lacy, Dengah, Fagan, & Most, 2011; Ryan, Rigby, & Przybylski, 2006) and negative outcomes (Andreassen et al., 2016; Brunborg, Mentzoni, & Frøyland, 2014; Lemola et al., 2011; Ogletree & Drake, 2007; Rehbein, Kleimann, & Mößle, 2010; Skoric, Teo, & Neo, 2009). However, research has not yet assessed whether the strength of these links depends upon, or is modulated by, individual differences in personality. The personality-diathesis model suggests that predispositional vulnerabilities, such as specific personality traits, can interact with situational factors to predict negative psychological outcomes (Ingram & Luxton, 2005; Zuckerman, 1999). In particular, research has consistently shown that low Emotional Stability (high Neuroticism) is a personality diathesis that, when coupled with significant stress, precipitates the onset of mental health issues including depression, anxiety, psychosis, and personality disorders (de Beurs, Deeg, & van Dyck, 2001; Jeronimus, Kotov, Riese, & Ormel, 2016; Jacobs et al., 2011; Jylhä & Isometsä, 2006; Krabbendam et al., 2002; Ormel, Rosmalen, & Farmer, 2004; van Os & Jones, 1999; Saulsman & Page, 2004). This study aims to assess whether Emotional Stability moderates the link between frequent gaming and measures of psychological well-being.

High Engagement, Problematic Gaming, and Psychological Well-being

Psychological research on gaming distinguishes between high engagement (i.e. gaming frequently or for long hours) and problematic/addictive gaming (i.e. gaming to the point of substantial interference with social, occupational, or psychological functioning; Billieux, Flayelle, Rumpf, & Stein, 2019; Brunborg et al., 2013, 2014; Charlton, 2002; Charlton & Danforth, 2007; Mentzoni et al., 2011; Peters & Malesky, 2008; Rehbein et al., 2010). Literature indicates that gaming is not necessarily detrimental; individuals can be highly engaged with gaming without it being problematic (Brunborg et al., 2013, 2014; Billieux et al., 2013, 2019; Charlton, 2002; Charlton & Danforth, 2007; Király, Tóth, Urbán, Demetrovics, & Maraz, 2017; Peters & Malesky, 2008; Skoric, Teo, & Neo, 2009). However, it is important to note that studies identify a correlation between the two behaviours, and there is evidence of a developmental process whereby gamers are first highly engaged before their gaming becomes problematic (Charlton & Danforth, 2007; Király et al., 2017; Peters & Malesky, 2008).

High engagement can be linked with negative outcomes for some people. For example, a study using NZAVS data examined whether time spent gaming per week correlated with negative psychological outcomes (Basabas & Sibley, 2020; N=21,060). Most participants from this study (77%) did not game at all as the general population, rather than a specific gaming community, was sampled. Results showed that relative to non-gamers, regular/habitual gamers (≥5.0 hours/week) experienced higher psychological distress (men $\beta = .042$, women $\beta = .042$), lower self-esteem (men $\beta = -.061$, women $\beta = -.033$), and lower body satisfaction (men $\beta = -.071$, women $\beta = -.032$). Casual gaming (.1-5.0 hours/week) was linked with poorer body satisfaction for men ($\beta = -.057$) and women ($\beta = -.032$), and lower self-esteem for men only ($\beta = -.061$). These findings support past research (e.g. Peters & Malesky, 2008) and broadly indicate that negative

outcomes are more prevalent among habitual gamers, while less frequent gamers experience fewer adverse outcomes. It remains an open question as to what factors may contribute to greater risk of problematic gaming or negative outcomes associated with gaming for some people.

Personality and Gaming Behaviours

Research on the links between personality and gaming behaviours is relatively new. Findings in this area are somewhat inconsistent as studies use different models of personality (Collins & Freeman, 2013; Potard et al., 2019; Worth & Book, 2014) and a diverse range of fairly informal sampling strategies (including snowball samples of gaming forum users or players of particular games; e.g., Abbasi et al., 2021; Phillips, Butt, & Blaszczynski, 2006; Shceck, Lee, & Pyo, 2015; Worth & Book, 2014, 2015; Zeigler-Hill & Monica, 2015). One key strength of extant research is that it tends to provide in-depth and specific measures of gaming behaviour, though this often comes at the expense of large-scale sampling that includes representative samples of both gamers and non-gamers.

This caveat aside, prior research indicates that personality traits are correlated with gaming behaviours. In a study with users of French-language gaming forums, participants who gamed daily tended to report lower Extraversion, Conscientiousness, and higher entitlement than less frequent gamers, and participants who gamed for longer sessions tended to report higher Neuroticism than those who played shorter sessions (Potard et al., 2019). In a study with MMORPG players, time spent gaming and Neuroticism were independently linked with problematic gaming, suggesting that personality differences may indicate who is at risk of experiencing negative outcomes linked with gaming (Peters & Malesky, 2008).

A study that did analyse a national probability sample (N=6,518) found that higher Openness to Experience and lower levels of Extraversion, Agreeableness, and Conscientiousness were associated with spending more hours gaming per week (Sibley et al., 2011). The NZAVS is a broad-ranging questionnaire that does not focus specifically on gaming. The study complements psychological research on gaming by providing national probability data, but measured gaming behaviour using only a single item asking for self-reports of how many hours people spend playing computer/video games per week. The NZAVS thus has different strengths and limitations that complement past research with more detailed measures (e.g. Shceck et al., 2015; Worth & Book, 2014), but less representative samples. Regardless, the body of work in this area, including NZAVS data, generally indicates that personality and gaming frequency are indeed linked—specifically, lower Conscientiousness and Extraversion are associated with higher frequency of gaming (Greitemeyer, 2015; Potard et al., 2019; Sibley et al., 2011; Ventura, Shute, & Kim, 2012).

Emotional Stability as a Personality Diathesis

The diathesis-stress model asserts that predispositional vulnerabilities can interact with situational factors to develop psychopathology (Ingram & Luxton, 2005; Zuckerman, 1999). Vulnerabilities are factors that predispose an individual to mental health problems, and situational factors refer to major or minor life events that disrupt individuals' physiological, emotional, or cognitive stability (Monroe & Simons, 1991; Ingram & Luxton, 2005). Low Emotional Stability, or high Neuroticism, is a well-established personality diathesis due to its characteristics such as reactivity to stress, sensitivity to threat, and propensity towards negative affect (Bolger & Schilling, 1991; DeYoung, 2010; Jacobs et al., 2011; Krabbendam et al., 2002; McCrae, 1990).

Low Emotional Stability/high Neuroticism plays a prominent role in predicting the onset of psychopathology in various domains including significant life events (Osborne & Sibley, 2013), marital relationships (Brock & Lawrence, 2014), clinical research (Jeronimus et al., 2016; Krabbendam et al,. 2016; Saulsman & Page, 2004), and internet use (Abbasi & Drouin, 2019; van der Aa et al., 2009). With regards to internet use, researchers speculate that although individuals—particularly those low in Emotional Stability—may use technology to improve their mood, doing so many actually exacerbate negative emotions and increase risk of addiction (Abbasi & Drouin, 2019; Charlton & Danforth, 2007; Kardefelt-Winther, 2014; Papacharissi & Mendelson, 2011; Peters & Malesky, 2008). This particular finding may hold implications for gaming.

To our knowledge, only one study has assessed the link between personality traits and problematic gaming: in a study with adult Filipino gamers, Reyes et al. (2019) found significant correlations between problematic gaming and lower Agreeableness, Conscientiousness, Extraversion, Openness, and high Neuroticism. Forward stepwise regression analyses revealed that Agreeableness and Conscientiousness accounted for the largest amount of variation in problematic gaming (13%) among these personality traits whilst Openness and Neuroticism accounted for very little unique variance.

Research has yet to better understand whether the link between gaming and poor psychological well-being is more or less pronounced for some people depending upon their underlying personality, and in particular, whether the negative correlates of gaming are more pronounced, or perhaps only occur, for those with higher Neuroticism/lower Emotional Stability specifically. The present study addresses previous calls for research to build an understanding of when and how gaming may have positive or negative impact, for whom, the factors that influence this, and where moderating relationships exist (Johnson et al., 2013).

Overview and Hypotheses

The present study uses data from Wave 8 of the New Zealand Attitudes and Value Study (NZAVS), a large-scale national probability sample of adults, to first test whether gaming regularly/habitually (≥5.0 hours/week) is correlated with three concurrent psychological outcomes (higher psychological distress, reduced self-esteem, and poorer body satisfaction) compared to non-gamers and casual gamers (.1-5.0 hours/week). These three outcomes were selected to concurrently encompass distinct aspects of psychological well-being: psychological distress is a broad measure of

psychological well-being (Kessler, 2002), self-esteem is a general, subjective evaluation of one's worth (Rosenberg, 1965), and body satisfaction is a more specific evaluation of one physical aspect about oneself (Dittmar, 2009). Past research generally shows that psychological distress is linked with both frequent (Mathers et al., 2009) and problematic gaming (Brunborg et al., 2013), and self-esteem may either be a cause or consequence of gaming (Hoare, Milton, Foster, & Allender, 2016; Ko, Yen, Chen, Chen, & Yen, 2005; Lemmens et al., 2011). Findings on the link between gaming and body satisfaction are more scarce: studies indicate that time spent gaming (Basabas & Sibley, 2020) and playing games that depict idealised male and female bodies (Barlett & Harris, 2008) can be linked with poorer body satisfaction, but internet gaming disorder symptoms were not significantly linked with body satisfaction (Kircaburun, Griffiths, & Billieux, 2019).

The study then tests whether, as with more general and widely replicated personality-diathesis interactions, the links between habitual gaming and the three outcomes differ depending on individual differences in personality—specifically, low versus high levels of Emotional Stability (Neuroticism). Consistent with general personality × situation interactions observed in other areas (e.g. Van der Aa et al., 2009), we hypothesize that low Emotional Stability (high Neuroticism) may exacerbate the link between habitual gaming and poorer psychological well-being.

This is the first known study to utilise a nationally representative adult sample to explore whether adverse psychological outcomes linked with gaming vary depending on levels of Emotional Stability. Understanding these possible links and profiling the personality traits that may lead to some people experiencing poorer psychological well-being concurrent with habitual gaming, whereas these negative outcomes are ameliorated or absent for others, is critical to understand as computer and video gaming becomes increasingly prevalent in our culture.

Hypotheses

We based our three hypotheses on the assumption that greater time spent gaming is linked with increased psychological distress, reduced self-esteem, and poorer body satisfaction (Basabas & Sibley, 2020; Peters & Malesky, 2008). First, we predicted that habitual gamers low in Emotional Stability would report higher psychological distress than non-gamers (Hypothesis 1; Jacobs et al., 2011). Second, we predicted that habitual gamers low in Emotional Stability would report lower self-esteem than non-gamers (Hypothesis 2; Amirazodi & Amirazodi, 2011; Jackson et al., 2010). Third, we predicted that habitual gamers low in Emotional Stability would report lower body satisfaction than non-gamers (Hypothesis 3; Neumark-Sztainer, Goeden, Story, & Wall, 2004; Swami, Hadji-Michael, & Furnham, 2008). We made no hypotheses for casual gaming interactions given past findings showing non-significant links between casual gaming and the three outcomes (Basabas & Sibley, 2020).

METHODS

Participants

We analyze data from wave 8 (2016) of the NZAVS which contained responses from a total of 21,936 participants. There were 3,252 people who were categorised as casual gamers and 1,605 people categorised as habitual gamers. Demographic information of the sample (N = 21,120) are presented in Table 1.

Sampling Procedure

The NZAVS is an ongoing 20-year longitudinal national probability study that began in 2009. Wave 8 was chosen for this study as it contained the largest available sample at time of analysis. The NZAVS collects nationally representative data on social attitudes, personality, and health outcomes using national probability samples of New Zealanders sampled from the electoral roll. Participants were sent a paper copy of the questionnaire, or if participants provided an email address, they were able to complete an online version of the questionnaire. Detailed information about the sampling procedures and yearly retention rates are provided by Sibley (2019).

The NZAVS performs relatively well with regards to representativeness, but contains biases including over-representation of women (62.6% sample; 50.6% census; Statistics New Zealand, 2019) and under-representation of Māori (11.2% sample; 16.5% census) and Asian (4.4% sample; 15.1% census) individuals. The standard NZAVS post-stratification weighting procedure for gender, ethnicity, and region was used to adjust the sample to be representative of the general population.

Sampling Procedure

Gaming behaviour was measured using the open-ended item "Please estimate how many hours you spent doing each of the following in the past week… Playing computer games". In previous work using the same NZAVS sample, analyses showed that 77% of participants did not game in the past week (Basabas & Sibley, submitted). Of those who indicated at least some time spent gaming, the median time reported was 5 hours per week (see Figure 1). Given the heavily skewed distribution of count data for reported hours spent gaming, 5 hours seemed a reasonable split point for binning participants based on gaming behaviours. Gaming behaviour was thus modelled using two dummy coded variables: the first represented casual gaming (i.e. operationalised as gaming between 0.1–5.0 hours per week), where 0=no and 1=casual gaming. The second represented habitual gaming (i.e. operationalised as gaming ≥5.0 hours per week), where 0=no and 1=habitual gaming. These dummy coded variables tested whether casual or habitual gamers differed from non-gamers on each outcome. Thus, participants were modelled as non-gamers, casual gamers, and habitual gamers.

Big-Six personality was measured using the Mini-IPIP6, which provides four-item indices of the six major dimensions of personality: Extraversion (α=.754), Agreeableness (α=.711), Conscientiousness (α=.679), Emotional Stability (i.e. Neuroticism; α=.722), Openness to Experience (α=.706), and Honesty-Humility (α=.776; Sibley et al., 2011). Items were rated from 1 (very

inaccurate) to 7 (very accurate). The Mini-IPIP6 was adapted from Donnellan, Oswald, Baird, and Lucas' (2006) original Mini-IPIP to also include a four-item marker scale for honesty-humility (Sibley et al., 2011).

Psychological distress was measured using the Kessler-6 scale (Kessler et al., 2002; α=.85). Participants were asked to rate items including "During the last 30 days, how often did… you feel hopeless?", "… you feel so depressed that nothing could cheer you up?", "… you feel exhausted?". Each item was rated on a 5-point scale ranging from 0 = none of the time to 4 = all of the time.

Self-esteem was measured using three items from the Rosenberg (1965) Self-Esteem Inventory (α=.70): "I… On the whole am satisfied with myself", "… Take a positive attitude toward myself", "… Am inclined to feel that I am a failure". Each item was rated on a scale of 1 (very inaccurate) to 7 (very accurate).

Body satisfaction was measured with the item "I am satisfied with the appearance, size and shape of my body" devised for the NZAVS (Stronge, 2018), rated on a scale of 1 (very inaccurate) to 7 (very accurate).

RESULTS

The first set of analyses estimated linear regression models predicting psychological distress, self-esteem, and body satisfaction simultaneously, with casual and habitual gaming and the Big-Six personality dimensions as predictors. Missing data for exogenous variables were estimated using Rubin's (1987) procedure for multiple imputation procedure with parameter estimates averaged over 100 datasets (thinned using every 200th iteration). The model was estimated using Full Information Maximum Likelihood, which allowed for missing data in the outcome measures, and robust estimation of the standard errors to adjust for possibly non-normality in residuals.

Regression coefficients predicting psychological distress are presented in Table 2. Habitual gaming was significantly linked with higher psychological distress (β = .02, p = .001) while casual gaming was not (β = .004, p > .05). Extraversion (β = -.097, p < .001), Conscientiousness (β = -.107, p < .001), and Honesty-Humility (β = -.081, p < .001) were negatively linked with psychological distress, while Agreeableness (β = .021, p = .003) and Emotional Stability (β = .485, p < .001) were positively linked with psychological distress. The interaction between habitual gaming and Emotional Stability was significant (β = .022, p = .001).

Regression coefficients predicting self-esteem are presented in Table 3. Habitual gaming was significantly associated with lower self-esteem (β = -.018, p = .002) while casual gaming was not (β = .001, p > .05). Extraversion (β = .178, p < .001), Conscientiousness (β = .136, p < .001, Openness to Experience (β = .034, p < .001), and Honesty-Humility (β = .067, p < .001) were positively linked with self-esteem, while Emotional Stability (β = -.492, p < .001) was negatively linked with self-esteem. Casual gaming and Agreeableness were not significantly linked with self-esteem. Again, the interaction between habitual gaming and Emotional Stability was significant (β = -.023, p = .001).

Regression coefficients predicting body satisfaction are presented in Table 4. The main effects of casual (β = -.029, p < .001) and habitual gaming (β = -.035, p < .001) were significantly linked with lower body satisfaction. Conscientiousness (β = .064, p < .001), Openness to Experience (β = .019, p = .015), and Honesty-Humility (β = .092, p < .001) were positively linked with body

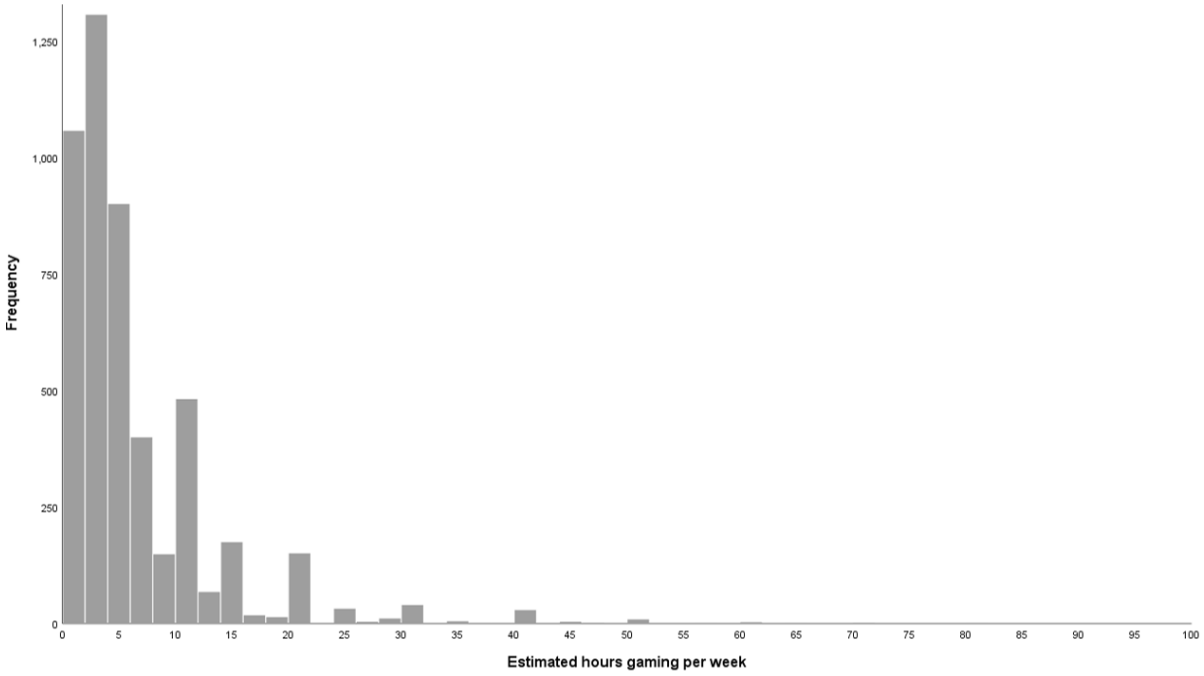

Figure 1. Frequency distribution of estimated hours gaming per week. Reprinted from "It's all just fun and games… right? Habitual gaming links with body dissatisfaction, psychological distress, and self-esteem", by M. C. Basabas and C. G. Sibley, 2020.

Table 1. Descriptive statistics for all independent, outcome, and covariate variables.

	M (*SD*)	*N* (%)	Item content
Body satisfaction (1 to 7)	4.25 (1.66)	21,120	I am satisfied with the appearance, size and shape of my body.
Psychological distress (0 to 4)	.88 (0.67)	21,120	e.g. During the last 30 days, how often did… you feel hopeless?
Self-esteem (1 to 7)	5.20 (1.23)	21,120	e.g. I… On the whole am satisfied with myself.
Age	49.50 (13.89)	21,120	What is your date of birth?
Regional deprivation (1 low, 10 high)	4.65 (2.74)	21,120	Deprivation of eighbourhood region (meshblock) based on 2013 census (Atkinson et al., 2014)
Qualification (1 low, 10 high)	5.32 (2.74)	21,120	What is your highest level of qualification?
BMI	27.49 (6.10)	21,120	What is your height? (metres)—What is your weight? (kgs)
Men		7,899 (37.4%)	What is your gender?
Women		13,221 (62.6%)	
Māori (0 no, 1 yes)		2,365 (11.2%)	Which ethnic groups do you belong to?
Pacific (0 no, 1 yes)		549 (2.6%)	
Asian (0 no, 1 yes)		9,293 (4.4%)	
Religious (0 no, 1 yes)		8026 (38.0%)	Do you identify with a religion and/or spiritual group?
Parent (0 no, 1 yes)		15,481 (73.3%)	How many children have you given birth to, fathered, or adopted?
Partner (0 no, 1 yes)		15,967 (75.6%)	What is your relationship status?
Employed (0 no, 1 yes)		16,579 (78.5%)	What is your current occupation?
Urban (0 no, 1 yes)		13,707 (64.9%)	Urban versus rural residential location coded from meshblock data (Statistics NZ, 2016)
Born in New Zealand (0 no, 1 yes)		16,769 (79.4%)	Where were you born? (please be specific, e.g., which town/city?)
Smoker (0 no, 1 yes)		1,753 (8.3%)	Do you currently smoke?
Disability (0 no, 1 yes)		4,794 (22.7%)	Do you have a health condition or disability that limits you, and has lasted 6+ months?
Heterosexual (0 no, 1 yes)		19,620 (92.9%)	What is your sexual orientation?
Gaming behaviour			Please estimate how many hours you spent… Playing computer games.
Casual Gamer (0 no, 1 yes)		3,252 (15.4%)	
Habitual gamer (0 no, 1 yes)		1,605 (7.6%)	
Personality			
Extraversion	3.91 (1.17)		e.g. I… am the life of the party.
Agreeableness	5.34 (.96)		e.g. I… sympathize with others' feelings.
Conscientiousness	5.08 (1.03)		e.g. I… get chores done right away.
Emotional Stability	3.47 (1.14)		e.g. I… have frequent mood swings.
Openness to Experience	4.93 (1.11)		e.g. I… have a vivid imagination.
Honesty-Humility	5.35 (1.19)		e.g. I… Deserve more things in life (reverse-coded)

Note. Percentages pertain to responses coded as 1, e.g. 79.4% of participants were born in New Zealand. Participants were able to identify with multiple ethnicities.

Table 2. Linear regression predicting psychological distress. (*N*=21,120)

	b	*SE*	*95% CI*	*β*	*t*
Age	-.008	.000	-.009, -.007	-.163	-25.090***
Regional deprivation	.006	.001	.004, .009	.026	4.571***
Qualification	-.002	.002	-.006, .001	-.009	-1.363
BMI	.001	.001	-.001, .002	.007	1.139
Gender	.030	.008	.015, .046	.022	3.821***
Māori	.004	.012	-.021, .028	.002	.306
Pacific	.054	.027	.001, .106	.013	2.013*
Asian	.048	.020	.008, .088	.015	2.367*
Religious	.002	.007	-.012, .017	.002	.285
Parent	-.028	.010	-.047, -.009	-.018	-2.871**
Partner	-.094	.009	-.112, -.075	-.060	-9.856***
Employed	-.079	.010	-.097, -.060	-.048	-8.219***
Urban	.017	.008	.003, .032	.012	2.294*
Born in New Zealand	-.020	.009	-.037, -.002	-.012	-2.162*
Sexual orientation	.038	.012	.015, .061	.019	3.272**
Smoker	.122	.015	.092, .151	.050	8.135***
Disability	.149	.009	.131, .167	.093	16.049***
Casual gamer	.008	.010	-.010, .027	.004	.873
Habitual gamer	.050	.015	.021, .080	.020	3.364**
Extraversion	-.056	.004	-.063, -.048	-.097	-14.947***
Agreeableness	.015	.005	.005, .025	.021	2.964**
Conscientiousness	-.070	.004	-.078, -.062	-.107	-16.437***
Emotional Stability	.288	.004	.280, .296	.485	70.928***
Openness to Experience	.007	.004	.000, .014	.012	1.871
Honesty-Humility	-.046	.004	-.053, -.038	-.081	-11.441***
Casual x Extraversion	-.013	.009	-.030, .004	-.009	-1.512
Casual x Agreeableness	-.011	.011	-.034, .011	-.006	-1.006
Casual x Conscientiousness	.012	.010	-.008, .032	.007	1.197
Casual x Emotional Stability	.005	.009	-.014, .024	.004	.582
Casual x Openness to Experience	.007	.010	-.011, .026	.005	.764
Casual x Honesty-Humility	.005	.009	-.013, .022	.003	.533
Habitual x Extraversion	-.020	.013	-.046, .006	-.010	-1.486
Habitual x Agreeableness	.005	.016	-.026, .037	.002	.330
Habitual x Conscientiousness	-.008	.014	-.036, .019	-.004	-.591
Habitual x Emotional Stability	**.044**	**.013**	**.019, .068**	**.022**	**3.463*** **
Habitual x Openness to Experience	.000	.014	-.027, .027	.000	-.023
Habitual x Honesty-Humility	.020	.013	-.005, .044	.010	1.562

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Significant interaction effect is bolded. Model fit: $R^2 = 44.2\%$, $p < .001$.

satisfaction, while Agreeableness (β = -.043, $p < .001$) and Emotional Stability (β = -.222, $p < .001$) were negatively linked with body satisfaction. No interaction effects were significant for this model.

The differences between habitual gamers with low (-1 *SD*) versus high (+1 *SD*) emotional stability, relative to non-gamers, were then estimated using standard simple slope equations (moderated regression). As predicted, regular/habitual gamers who were low in Emotional Stability reported significantly higher levels of psychological distress than non-gamers in general (b = .100, SE = .023, t = 4.28, $p < .001$). By contrast, habitual

Table 3. Linear regression predicting self-esteem. (*N*=21,120)

	b	*SE*	*95% CI*	*β*	*t*
Age	.004	.001	.003, .006	.049	7.591***
Regional deprivation	-.002	.003	-.007, .003	-.005	-.800
Qualification	.010	.003	.004, .016	.023	3.344**
BMI	-.016	.001	-.018, -.014	-.079	-13.297***
Gender	-.009	.014	-.037, .019	-.004	-.628
Māori	.059	.022	.015, .102	.015	2.655**
Pacific	.168	.044	.082, .253	.021	3.830***
Asian	.171	.034	.103, .238	.028	4.976***
Religious	.019	.014	-.007, .046	.008	1.432
Parent	.074	.018	.040, .109	.027	4.200***
Partner	.157	.017	.123, .190	.055	9.184***
Employed	.070	.017	.036, .103	.023	4.076***
Urban	-.056	.014	-.083, -.029	-.022	-4.080
Born in New Zealand	-.061	.017	-.094, -.028	-.020	-3.665***
Sexual orientation	.035	.020	-.004, .074	.010	1.743
Smoker	-.064	.026	-.114, -.014	-.014	-2.489*
Disability	-.121	.017	-.153, -.088	-.041	-7.292***
Casual gamer	.002	.018	-.033, .037	.001	.121
Habitual gamer	-.083	.026	-.135, -.032	-.018	-3.160**
Extraversion	.187	.007	.173, .201	.178	26.430***
Agreeableness	.007	.009	-.011, .026	.006	.803
Conscientiousness	.162	.008	.146, .177	.136	20.464***
Emotional Stability	-.535	.007	-.549, -.520	-.492	-72.173***
Openness to Experience	.038	.007	.024, .053	.034	5.133***
Honesty-Humility	.069	.007	.055, .083	.067	9.810***
Casual x Extraversion	.003	.017	-.030, .036	.001	.186
Casual x Agreeableness	.010	.021	-.031, .050	.003	.462
Casual x Conscientiousness	.018	.019	-.019, .055	.006	.938
Casual x Emotional Stability	-.012	.017	-.046, .022	-.004	-.705
Casual x Openness to Experience	-.007	.018	-.043, .028	-.003	-.410
Casual x Honesty-Humility	.017	.017	-.015, .050	.007	1.033
Habitual x Extraversion	.044	.024	-.004, .092	.012	1.816
Habitual x Agreeableness	.002	.030	-.058, .061	.000	.051
Habitual x Conscientiousness	.025	.026	-.026, .075	.006	.968
Habitual x Emotional Stability	**-.082**	**.024**	**-.129, -.035**	**-.023**	**-3.444****
Habitual x Openness to Experience	-.004	.025	-.053, .045	-.001	-.153
Habitual x Honesty-Humility	.001	.023	-.045, .046	.000	.024

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Significant interaction effect is bolded. Model fit: $R^2 = 44.4\%$, $p < .001$.

gamers with high levels of Emotional Stability did not differ from non-gamers in their level of psychological distress (*b* = .001, *SE* = .018, *t* = .047, *p* = .962). A similar pattern was observed for low self-esteem. Habitual gamers who were low in Emotional Stability reported significantly lower self-esteem than non-gamers (*b* = -.177, *SE* = .042, *t* = -4.26, *p* < .001). In contrast, habitual gamers with high levels of Emotional Stability did not differ from non-gamers in self-esteem (*b* = .010, *SE* = .034, *t* = .295, *p* = .768). Habitual gaming was linked with lower body satisfaction for individuals both high and low in Emotional Stability (i.e., Emotional Stability did not

Table 4. Linear regression predicting body satisfaction. (*N*=21,120)

	b	*SE*	*95% CI*	*β*	*t*
Age	.007	.001	.005, .009	.059	7.884***
Regional deprivation	.016	.004	.008, .024	.026	4.100***
Qualification	.005	.005	-.004. .014	.008	1.026
BMI	-.104	.002	-.108, -.100	-.382	-48.283***
Gender	.395	.022	.352, .439	.115	17.856***
Māori	.108	.035	.040, .176	.021	3.114**
Pacific	.452	.076	.303, .600	.043	3.114***
Asian	.117	.052	.014, .219	.014	2.222*
Religious	.066	.021	.024, .107	.019	3.119**
Parent	.036	.027	-.017, .088	.010	1.339
Partner	.042	.026	-.008, .092	.011	1.644
Employed	-.036	.026	-.088, .016	-.009	-1.352
Urban	-.032	.021	-.074, .009	-.009	-1.528
Born in New Zealand	-.085	.026	-136, -.035	-.021	-3.303**
Sexual orientation	.108	.031	.046, .169	.022	3.427**
Smoker	.051	.040	-.027, .129	.008	1.279
Disability	-.132	.025	-.181, -.082	-.033	-5.166***
Casual gamer	-.133	.028	-.187, -.079	-.029	-4.810***
Habitual gamer	-.218	.041	-.299, -.137	-.035	-5.261***
Extraversion	.098	.011	.077, .119	.069	9.123***
Agreeableness	-.075	.014	-.102, -.048	-.043	-5.445***
Conscientiousness	.103	.012	.080, .126	.064	8.611***
Emotional Stability	-.324	.011	-.346, -.302	-.222	-28.673***
Openness to Experience	.028	.011	.005, .050	.019	2.439*
Honesty-Humility	.128	.011	.107, .149	.092	11.881***
Casual x Extraversion	-.005	.026	-.055, .046	-.001	-.186
Casual x Agreeableness	.048	.031	-.013, .108	.011	1.549
Casual x Conscientiousness	.010	.028	-.046, .065	.002	.340
Casual x Emotional Stability	.017	.025	-.033, .066	.004	.658
Casual x Openness to Experience	-.002	.026	-.054, .050	-.001	-.076
Casual x Honesty-Humility	-.009	.025	-.059, .040	-.003	-.374
Habitual x Extraversion	.005	.035	-.064, .073	.001	.138
Habitual x Agreeableness	.013	.043	-.071, .097	.002	.299
Habitual x Conscientiousness	.032	.038	-.042, .105	.006	.847
Habitual x Emotional Stability	-.020	.034	-.085, .046	-.004	-.584
Habitual x Openness to Experience	-.052	.037	-.125, -.022	-.010	-1.384
Habitual x Honesty-Humility	-.038	.033	-.104, .027	-.008	-1.146

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Model fit: $R^2 = 27.4\%$, $p < .001$.

moderate this association). These results held when adjusting for a range of covariates (see Table 1).

DISCUSSION

Our analyses showed that generally, habitual gaming is adversely associated with all three outcomes, while casual gaming is associated with lower body satisfaction only. These findings indicate that casual gamers reported similar levels of psychological distress and self-esteem as non-gamers, whereas habitual gamers reported markedly lower measures than casual- and non-gamers.

Previously, research had yet to assess whether the links between gaming and psychological well-being varies depending on one's level of Emotional Stability.

We present novel findings by documenting a classic personality × situation interaction in terms of gaming, Emotional Stability, and psychological well-being. Critically, habitual gamers low in Emotional Stability experienced higher psychological distress and lower self-esteem relative to non-gamers in general, and these links were absent for habitual gamers high in Emotional Stability, supporting Hypotheses 1 and 2. Contrary to Hypothesis 3, ratings of body satisfaction among habitual gamers did not differ between those high versus low in Emotional Stability. In summary, Emotional Stability modulated the links between habitual gaming and psychological well-being: lower levels of Emotional Stability were linked with poorer psychological well-being for habitual gamers, while high levels of Emotional Stability buffered against this adverse association.

The interactions between habitual gaming and Emotional Stability have two possible interpretations: first, if habitual gaming leads to poorer psychological well-being, then individuals low in Emotional Stability were more susceptible to the negative outcomes of gaming. This may be due to the greater fluctuations in negative affectivity and sensitivity to stress associated with low Emotional Stability (Jacobs et al., 2011; McCrae, 1990). Alternatively, habitual gaming may be used as a coping strategy to alleviate negative feelings arising from poor psychological well-being (Granic, Lobel, & Engels, 2014; Kardefelt-Winther, 2014a, 2014b); perhaps the tendency towards negative affect drove those low in Emotional Stability to game habitually. We intend to conduct further longitudinal research examining which of these two possible causal effects explains the patterns observed in the current study. Regardless of which interpretation (or some combination of both) holds, for now, our results highlight a specific personality profile (low Emotional Stability) of those for whom habitual gaming is more strongly linked with poorer psychological well-being.

The effect sizes of the moderating effect of Emotional Stability are noteworthy. In predicting psychological distress, the interaction between habitual gaming and Emotional Stability produced a standardised beta of .022, and -.023 for predicting self-esteem. Compared to the individual effect of Emotional Stability on these outcomes (standardised betas of .485 and -.492 for psychological distress and self-esteem respectively), the interaction effects are fairly small. However, we emphasize the fact that we analysed a large national probability sample. We aimed to detect even subtle patterns that plausibly signal more specific processes underlying the relationship between gaming and psychological well-being. Previous work shows that in using broad measures among general population samples, the NZAVS can provide reliable population estimates for a range of outcomes. Examples include estimating political party vote intentions that closely track random-digit dial polls in the lead-up to a national election (Satherley et al., 2015); and tracking, estimating change over time, and correctly projecting the result of a referendum to change the New Zealand flag (Satherley, Yogeeswaran, Osborne, & Sibley, 2018). Thus, an important contribution of the present study is signalling a significant interaction between gaming and personality in the general adult population rather than a gaming community specifically. As personality factors had not previously been assessed in relation to the link between gaming and psychological well-being, our findings create new avenues for research to identify more specific processes regarding these factors.

Habitual gaming and Emotional Stability were both independently linked with lower body satisfaction. However, Emotional Stability did not moderate the link between habitual gaming and body satisfaction; individuals both low and high on Emotional Stability reported lower body satisfaction than non-gamers. With the inevitable benefit of hindsight, this is perhaps not a surprising finding as past studies show that other health-related (e.g. exercise) and sociocultural factors (e.g. sexism, visual media) are more relevant to body (dis)satisfaction (Forbes, Doroszewicz, Card, & Adams-Curtis, 2004; Fredrickson & Roberts, 1997; LePage & Crowther, 2010). It is also worth noting that our model predicting body satisfaction accounted for less variance (27.4%) relative to psychological distress (44.2%) and self-esteem (44.4%), and thus generally performed more poorly overall.

Using a national probability sample, the present study identified significant localised effects of Emotional Stability on the links between habitual gaming and psychological distress and self-esteem. This paper provides some major contributions to psychological research on gaming: first, we document a classic personality × situation interaction wherein the links between habitual gaming and psychological distress and self-esteem vary depending on individual differences in Emotional Stability. This extends from existing work documenting the role of Emotional Stability/Neuroticism in precipitating negative psychological and behavioural outcomes in various domains (e.g. Chow & Wan, 2017; Jeronimus et al., 2016). Second, this paper contributes to ongoing research regarding the relationship between gaming and psychological well-being and the antecedents of gaming addiction (e.g Billieux et al., 2019; Deleuze, Long, Liu, Maurage, & Billieux, 2018). By assessing the moderating role of Emotional Stability, we identified important personality differences that predict who may be at greater risk of negative psychological outcomes linked with habitual gaming. Lastly, this is the first study to utilise a nationally representative sample of adults to assess the links between gaming, personality, and psychological well-being concurrently.

Caveats and Future Directions

The broad, single-item measure of gaming limited our findings to an extent. Operationalising habitual gaming as simply 'playing at least five hours in the past week' ignores other aspects of gaming such as content (e.g. mature, general audience), genre (e.g. MMORPGs, puzzle), and motivations (e.g. escapism, achievement). Examining such factors could reveal whether certain aspects of computer/video games are more strongly linked with negative outcomes among regular/habitual gamers with low Emotional Stability. For example, future studies could examine whether people who play competitive online games, where cyberbullying and sexual harassment

can occur (Ballard & Welch, 2016; Choe, Doh, & Ha, 2019; Fox & Tang, 2014; Fryling, Cotler, Rivituso, Mathews, & Pratico, 2015), experience more adverse outcomes than those who play less competitive games, and if Emotional Stability moderates these effects as well. As fairly little is currently known about processes underlying the links between gaming and psychological well-being, future research would do well to hone in on specific aspects of video games and gaming habits to build a more comprehensive understanding of this relationship.

It is possible that people do not consider mobile games as 'computer games'. Mobile gaming has become extremely commonplace in recent years, with market researchers finding that 50% of smartphone app users played a mobile game in the past week (Activision Blizzard Media & Newzoo, 2019). As our single-item measure of gaming uses the term 'computer games', our data may have excluded people who spend a significant amount of time playing mobile games. Excluding this player base could therefore have skewed our results towards the 'casual' end. Our findings should be interpreted and generalised with some caution, such that they pertain to people who play on gaming consoles and computers.

Another potential limitation is that the measures used in this study were self-reported. In addition to the above limitation wherein habitual mobile game players may have self-excluded themselves, the reported number of hours gamed may not reflect actual weekly hours spent gaming. This is not a major caveat as the NZAVS has demonstrated good reliability in past studies in a range of domains including estimates of voter intentions that closely tracked random-digit dial political polls in the lead-up to a national election (Sibley et al., 2017); tracking, estimating change over time, and correctly projecting referendum results (Satherley, Yogeeswaran, Osborne, & Sibley, 2018); and population estimates for changes in laws, such as abortion and euthanasia, that closely match other polling data (see for example, Young, Egan, Walker, Graham-DeMello, & Jackson, 2019).

Due to the correlational nature of this study, causal inferences cannot reasonably be made from our findings. Our findings broadly indicate that individuals low in Emotional Stability were more likely to experience poorer psychological well-being in conjunction with habitual gaming than those high in Emotional Stability; whether poor psychological well-being is a cause or consequence of habitual gaming, and the specific ways in which Emotional Stability affects this relationship, are unknown. Indeed, considering the growing interest in the psychological ramifications of gaming (Pontes & Griffiths 2020), it is important for research to assess which of these causal processes holds. However, as no study had yet utilised a national probability sample in examining the links between gaming, personality, and psychological well-being, we thought it important to first assess whether these links persist within a general adult population. Our findings thus provide a reliable basis on which forthcoming studies using smaller samples can conduct more detailed analyses on the links between gaming and psychological well-being. Specifically, we expect to see more research identifying who, in terms of personality and gaming habits, may be at greater risk of experiencing adverse psychological and behavioural outcomes in conjunction with frequent gaming.

Conclusion

Despite the growing use and popularity of video games, there is little research regarding its links with personality and psychological well-being among adults. Informed by research across various domains (e.g. Reyes et al., 2019; Sibley et al., 2011), we assessed whether individual differences in personality, specifically Emotional Stability, modulated the links between habitual gaming and psychological well-being. We found that habitual gamers who were low in Emotional Stability reported increased psychological distress and lower self-esteem than non-gamers, while these adverse associations were absent for habitual gamers high in Emotional Stability. In contrast, Emotional Stability did not moderate the association between habitual gaming and body satisfaction. Emotional Stability thus exacerbated or buffered against the links between habitual gaming and poorer psychological well-being, depending on individual differences in personality.

Documenting a significant personality × situation interaction with a large-scale national probability adult sample makes an important contribution to identifying for whom, and under which conditions, gaming is linked with poorer psychological well-being. Primarily, our findings inform and offer avenues for additional research to better understand when, how, and for whom video games are linked with positive and negative outcomes. Educators and researchers who wish to intend to inform people about the potential impacts that underlying factors like personality have on the psychological outcomes of gaming.

References

Abbasi, I. & Drouin, M. (2019). Neuroticism and Facebook addiction: How social media can affect mood? *The American Journal of Family Therapy, 47*, 199-215. doi: 10.1080/01926187.2019.1624223

Abbasi, A. Z., Shah, M. U., Rehman, U., Hlavacs, H., Ting, D. H., & Nisar, S. (2021). The role of personality factors influencing consumer video game engagement in young adults: A study on generic games. *IEEE Access, 9*, 17392-17410. doi: 10.1109/ACCESS.2021.3053207

Activision Blizzard Media & Newzoo. (2019). Betting on billions: Unlocking the power of mobile gamers. San Francisco, CA.

Amirazodi, F. & Amirazodi, M. (2011). Personality traits and self-esteem. *Procedia – Social and Behavioral Sciences, 29*, 713-716. doi: 10.1016/j.sbspro.2011.11.296

Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A

large-scale cross-sectional study. *Psychology of Addictive Behaviors, 30*, 252-262. doi: 10.1037/adb0000160

Ballard, M. E. & Welch, K. M. (2017). Virtual warfare: Cyberbullying and cyber-victimization in MMOG play. *Games and Culture, 12*, 466-491. doi: 10.1177/1555412015592473

Barlett, C. P. & Harris, R. J. (2008). The impact of body emphasizing video games on body image concerns in men and women. *Sex Roles, 59*, 586-601. doi: 10.1007/s11199-008-9457-8

Basabas, M. C. & Sibley, C. G. (2020). It's all just fun and games… right? Habitual gaming links with body dissatisfaction, psychological distress, and lower self-esteem. *New Zealand Journal of Psychology, 49*, 23-33.

Billieux, J., Flayelle, M., Rumpf, H-J., & Stein, D. J. (2019). High involvement versus pathological involvement in video games: a crucial distinction for ensuring the validity and utility of gaming disorder. *Current Addiction Reports, 6*, 323-330. doi: 10.1007/s40429-019-00259-x

Bolger, N. & Schilling, E. A. (1991). Personality and the problems of everyday life: The role of neuroticism in exposure and reactivity to daily stressors. *Journal of Personality, 59*, 355-386. doi: 10.1111/j.1467-6494.1991.tb00253.x

Brunborg, G. S., Mentzoni, R. A., Melkevik, O. R., Torbjørn, T., Samdal, O. … Palleson, S. (2013). Gaming addiction, gaming engagement, and psychological health complaints among Norwegian adolescents. *Media Psychology, 16*, 115-128. doi: 10.1080/15213269.2012.756374

Brunborg, G. S., Mentzoni, R. A., & Frøyland, L. R. (2014). Is video gaming, or video game addiction, associated with depression, academic achievement, heavy episodic drinking, or conduct problems? *Journal of Behavioral Addictions, 3*, 27-32. doi: 10.1556/JBA.3.2014.002

Charlton, J. P. (2002). A factor-analytic investigation of computer 'addiction' and engagement. *British Journal of Pyschology, 93*, 329-344. doi: 10.1348/000712602760146242

Charlton, J. P. & Danforth, I. D. W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior, 23*, 1531-1548. doi: 10.1016/j.chb.2005.07.002

Choe, K., Doh, S-J., & Ha, J. (2019). Adolescents' experiences and coping with sexism affect both female and male online gamers in South Korea. *Sex Roles.* doi: https://doi.org/10.1007/s11199-019-01094-0

Chow, T. S. & Wan, H. Y. (2017). Is there any 'Facebook Depression'? Exploring the moderating roles of neuroticism, Facebook social comparison and envy. *Personality and Individual Differences, 119*, 277-282. doi: 10.1016/j.paid.2017.07.032

Collins, E. & Freeman, J. (2013). Do problematic and non-problematic video game players differ in extraversion, trait empathy, social capital and prosocial tendencies? *Computers in Human Behavior, 29*, pp. 1933-1940. doi: http://dx.doi.org/10.1016/j.chb.2013.03.002

De Beurs, E., Deeg, D. J. H., & van Dyck, R. (2001). On becoming depressed or anxious in late life: similar vulnerability factors but different effects of stressful life events. *The British Journal of Psychiatry, 179*, 426-431. doi: 10.1192/bjp.179.5.426

Deleuze, J., Long, J., Liu, T-Q., Maurage, P., Billieux, J. (2018). Passion or addiction? Correlates of healthy versus problematic use of videogames in a sample of French-speaking regular players. *Addictive Behaviors, 82*, 114-121. doi: 10.1016/j.addbeh.2018.02.031

DeYoung, C. G. (2010). Toward a Theory of the Big Five. *Psychological Inquiry, 21*, 26-33. doi: 10.1080/10478401003648674

Dittmar, H. (2009). How do "body perfect" ideals in the media have a negative impact on body image and behaviors? Factors and processes related to self and identity. Journal of Social and Clinical Psychology, 28, 1–8. doi: 10.1521/jscp.2009.28.1.1

Forbes, G. B., Doroszewics, K. Card, K., & Adams-Curtis, L. (2004). Association of the thin body ideal, ambivalent sexism, and self-esteem with body acceptance and the preferred body size of college women in Poland and the United States. *Sex Roles, 50*, 331-345. doi: 10.1023/b:sers.0000018889.14714.20

Fox, J. & Tang, W. Y. (2014). Sexism in online video games: The role of conformity to masculine norms and social dominance orientation. *Computers in Human Behavior, 33*, 314-320. doi: 10.1016/j.chb.2013.07.014

Fredrickson, B. L. & Roberts, T-A. (1997). Objectification Theory: Toward understanding women's lived experiences and mental health risks. *Psychology of Women Quarterly, 21*, 173-206. doi: 10.1111/j.1471-6402.1997.tb00108.x

Fryling, M., Cotler, J., Rivituso, J., Mathews, L., & Pratico, S. (2015). Cyberbullying or normal game play? Impact of age, gender, and experience on cyberbullying in multi-player online gaming environments: Perceptions from one gaming forum. *Journal of Information Systems Applied Research, 8*, 4-15. Retrieved from: http://jisar.org/2015-8/N1/JISARv8n1.pdf#page=4

Granic, I., Lobel, A., & Engels, R. (2014). The benefits of playing video games. *American Psychologist, 69*, 66-78. doi: 10.1037/a0034857

Greitemeyer, T. (2015). Everyday sadism predicts violent video game preferences. *Personality and Individual Differences, 75*, pp. 19-23. doi: 10.1016/j.paid.2014.10.049

Hoare, E., Milton, K., Foster, C., & Allender, S. (2016). The associations between sedentary behaviour and mental health among adolescents: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 13*, 1-22. doi: 10.1186/s12966-016-0432-4

Jackson, L. A., von Eye, A., Fitzgerald, H. E., Zhao, Y., & Witt, E. A. (2010). Self-concept, self-esteem, gender, race and information technology use. *Computers in Human Behavior, 26*, 323-328. doi: 10.1016/j.chb.2009.11.001

Jacobs, N., van Os, J., Derom, C., Thiery, E., Delespaul, P., & Wichers, M. (2011). Neuroticism explained? From a non-informative vulnerability marker to informative person– context interactions in the realm of daily life. *British Journal of Clinical Psychology, 50*, 19-32. doi: 10.1348/014466510X491397

Jeronimus, B. F., Kotov, R., Riese, H., & Ormel, J. (2016). Neuroticism's prospective association with mental disorders halves after adjustment for baseline symptoms and psychiatric history, but the adjusted association hardly decays with time: A meta-analysis on 59 longitudinal/prospective studies with 443 313 participants. *Psychological Medicine, 46*, 2883-2906. doi: 10.1017/S0033291716001653

Johnson, D., Wyleth, P., & Sweetser, P. (2013). The People-Game-Play Model for understanding videogames' impact on wellbeing. *2013 IEEE International Games Innovation*

Conference (IGIC), 85-88. doi: 10.1109/IGIC.2013.6659143

Jylhä, P. & Isometsä, E. (2006). The relationship of neuroticism and extraversion to symptoms of anxiety and depression in the general population. *Depression and Anxiety, 23*, 281-289. doi: 10.1002/da.20167

Kardefelt-Winther, D. (2014a). The moderating role of psychosocial well-being on the relationship between escapism and excessive online gaming. *Computers in Human Behavior, 38*, 68-74. doi: 10.1016/j.chb.2014.05.020

Kardefelt-Winther, D. (2014b). A conceptual and methodological critique of internet addiction research: Towards a model of compensatory internet use. *Computers in Human Behavior, 31*, 351-354. doi: 10.1016/j.chb.2013.10.059

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S.-L. T., … & Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine, 32*, 959-976. doi: 10.1017?S0033291702006074

Király, O., Tóth, D., Urbán, R., & Demetrovics, Z. (2017). Intense video gaming is not essentially problematic. *Psychology of Addictive Behaviors, 31*(7), 807-817. doi: 10.1037/adb0000316

Kircaburun, K., Griffiths, M. D., & Billieux, J. (2019). Psychosocial factors mediating the relationship between childhood emotional trauma and internet gaming disorder: A pilot study. *European Journal of Psychotraumatology, 10*, 1565031. doi: 10.1080/20008198.2018.1565031

Ko, C., Yen, J.-Y., Chen, C.-C., Chen, S.-H., & Yen, C.-F. (2005). Gender differences and related factors affecting online gaming addiction among Taiwanese adolescents. *Journal of Nervous and Mental Disease, 193*, 273-277. doi: 10.1097/01.nmd.0000158373.85150.57

Krabbendam, L., Janssen, L., Bak, Maarten, Bijl, R. V., de Graaf, R., & van Os, J. (2002). Neuroticism and low self-esteem as risk factors for psychosis. *Social Psychiatry and Psychiatric Epidemiology, 37*, 1-6. doi: 10.1007/s127-002-8207-y

Lemmens, J. S., Valkenburg, P, M., & Peter, J. (2011). Psychosocial causes and consequences of pathological gaming. *Computers in Human Behavior, 27*, 144-152. doi: 10.1016/j.chb.2010.07.015

Lemola, S., Brand, S., Vogler, N., Perkinson-Gloor, N., Allemand, M., & Grob, A. (2011). Habitual computer game playing at night is related to depressive symptoms. *Personality and Individual Differences, 51*, 117-122. doi: 10.1016/j.paid.2011.03.024

LePage, M. L. & Crowther, J. H. (2010). The effects of exercise on body satisfaction and affect. *Body Image, 7*, 124-130. doi: 10.1016/j.bodyim.2009.12.002

McCrae, R. R. (1990). Controlling neuroticism in the measurement of stress. *Stress Medicine, 6*, 237-241. doi: 10.1002/smi.2460060309

Mentzoni, R. A., Brunborg, G. S., Molde, H., Myrseth, H., Kouverøe, K. J. M., Hetland, J., & Pallesen, S. (2011). Problematic video game use: Estimated prevalence and associations with mental and physical health. *Cyberpsychology, Behavior, and Social Networking, 14*, 591-596. doi: 10.1089/cyber.2010.0260b

Monroe, S. M. & Simons, A. D. (1991). Diathesis-stress theories in the context of life stress research implications for the depressive disorders. *Psychological Bulletin, 110*, 406-425. doi: 10.1037//0033-2909.110.3.406

Neumark-Sztainer, D., Goeden, C., Story, M., & Wall, M. (2004). Associations between body satisfaction and physical activity in adolescents: Implications for programs aimed at preventing a broad spectrum of weight-related disorders. *Eating Disorders, 12*, 125-137. doi: 10.1080/10640260490444989

Ogletree, S. M. & Drake, R. (2007). College students' video game participation and perceptions: Gender differences and implications. *Sex Roles, 56*, 537-542. doi: 10.1007/s11199-007-9193-5

Ormel, J., Rosmalen, J., & Farmer, A. (2004). Neuroticism: a non-informative marker of vulnerability to psychopathology. *Social Psychiatry and Psychiatric Epidemiology, 39*, 906-912. doi: 10.1007/s00127-004-0873-y

van Os, J. & Jones, P. B. (1999). Early risk factors and adult person–environment relationships in affective disorder. *Psychological Medicine, 29*, 1055-1067. doi: 10.1017/S0033291799001026

Osborne, D. & Sibley, C. G. (2013). After the disaster: Using the Big-Five to predict changes in mental health among survivors of the 2011 Christchurch earthquake. *Disaster Prevention and Management: An International Journal, 22*, 456-466. doi: 10.1108/DPM-09-2013-0161

Papacharissi, Z. & Mendelson, A. (2011). Toward a new(er) sociability: Uses, gratifications and social capital on Facebook. In S. Papathanassopoulos (Ed.), *Media perspectives for the 21st century* (pp. 212-230). Oxon, UK: Routledge.

Peters, C. S. & Malesky, L. A. (2008). Problematic usage among highly-engaged players of massively multiplayer online role playing games. *Cyberpsychology & Behavior, 11*, 481-484. doi: 10.1089/cpb.2007.0140

Phillips, J. G., Butt, S., & Blaszczynski, A. (2006). Personality and self-reported use of mobile phones for games. *Cyberpsychology & Behavior, 9*, 753-758. doi: 10.1089/cpb.2006.9.753

Pontes, H. M. & Griffiths, M. D. (2020). A new era for gaming disorder research: Time to shift from consensus to consistency. *Addictive Behaviors, 103*, 106059. doi: 10.1016/j.addbeh.2019.106059

Potard, C., Henry, A., Boudoukha, A-H., Courtois, R., Laurent, A., & Lignier, B. (2019). Video Game Players' Personality Traits: An Exploratory Cluster Approach to Identifying Gaming Preferences. *Psychology of Popular Media Culture.* Advance online publication. doi:10.1037/ppm0000245

Przybylski, A. K., Ryan, R. M., and Rigby, C. S. (2009). The motivating role of violence in video games. *Personality and Social Psychology Bulletin, 35*, 243–259. doi: 10.1177/0146167208327216

Rehbein, F., Kleimann, M., & Möβle, T. (2010). Prevalence and risk factors of video game dependency in adolescence: results of a German nationwide survey. *Cyberpsychology, Behavior, and Social Networking, 13*, 269-277. doi: 10.1089/cyber.2009.0227

Reyes, M. E. S., Davis, R. D., Lim, R. A. N. N., Lim, K. R. S., Paulino, R. F., Carandang, A. M., & Azarraga, M. G. S. (2019). Five-factor model traits as predictors of pathological gaming among selected Filipino gamers. *Psychological Studies, 64*, 213-220. 10.1007/s12646-019-00498-y

Rosenberg, M. (1965). *Society and the Adolescent Self-Image.* Princeton, NJ: Princeton University Press.

Rubin, D.B. (1987). *Multiple imputation for nonresponse in surveys*. New York: John Wiley and Sons.

Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion, 30*, 347–363. doi:10.1007/s11031-006-9051-8

Satherley, N., Milojev, P., Greaves, L. M., Huang, Y., Osborne, D., Bulbulia, J., & Sibley, C. G. (2015). Demographic and Psychological Predictors of Panel Attrition: Evidence from the New Zealand Attitudes and Values Study. *PLoS ONE, 10*, e0121950. Doi: 10.1371/journal.pone.0121950

Satherley, N., Yogeeswaran, K., Osborne, D., & Sibley, C. G. (2018). If they say "yes," we say "no": Partisan cues increase polarization over national symbols. *Psychological Science, 29*, 1996–2009. doi:10.1177/0956797618805420

Shceck, K., Lee, D. Y., & Pyo, K. B. (2015). The relationship between the five factor personality model and motivations for play in MMORPGS. *Indian Journal of Science and Technology, 8*. doi: 10.17485/ijst/2015/v8i21/78457

Saulsman, L. M. & Page, A. C. (2004). The five-factor model and personality disorder empirical literature: A meta-analytic review. *Clinical Psychology Review, 23*, 1055-1085. doi: 10.1016/j.cpr.2002.09.001

Sibley, C. G. (2019). Sampling procedure and sample details for the New Zealand Attitudes and Values Study. *NZAVS Technical Documents, e01*. Retrieved from: https://cdn.auckland.ac.nz/assets/psych/about/our-research/nzavs/NZAVSTechnicalDocuments/NZAVS-Technical-Documents-e01-Sampling-Procedure-and-Sample-Details.pdf

Sibley, C. G., Luyten, N., Purnomo, M., Mobberley, A., Wootton, L. W., … Robertson, A. (2011). The Mini-IPIP6: Validation and extension of a short measure of the Big-Six factors of personality in New Zealand. *New Zealand Journal of Psychology, 40*, 142-159. Retrieved from: https://www.psychology.org.nz/wp-content/uploads/SibleyIPIP.pdf

Skoric, M. M., Teo, L. L. C., & Neo, R. L. (2009). Children and video games: Addiction, engagement, and scholastic achievement. *Cyberpsychology & Behavior, 12*, 567-572. doi: 10.1089/cpb.2009.0079

Snodgrass, J., Lacy, M., Dengah, F., Fagan, J., & Most, D. (2011b). Magical flight and monstrous stress: technologies of absorption and mental wellness in Azeroth. *Culture, Medicine, and Psychiatry, 35*, 26–62. doi: 10.1007/s11013-010-9197-4

Statistics New Zealand. (2019). *2018-census-population-and-dwelling-counts.xlsx* [Excel file, 2018 Census population and dwelling counts]. Retrieved from https://www.stats.govt.nz/assets/Uploads/2018-Census-population-and-dwelling-counts/Download-data/2018-census-population-and-dwelling-counts.xlsx

Stronge, S. (2018). Archive of NZAVS items and original scales. *NZAVS Technical Documents, e28*.

Swami, V., Hadji-Michael, M., & Furnham, A. (2008). Personality and individual difference correlates of positive body image. *Body Image, 5*, 322-325. doi: 10.1016/j.bodyim.2008.03.007

Ventura, M., Shute, V., & Kim, Y. J. (2012). Video gameplay, personality and academic performance. *Computers and Education, 58*, pp. 1260-1266. doi: 10.1016/j.compedu.2011.11.022

Widiger, T.A. (2009). Neuroticism. In M. R. Leary & Hoyle, R. H. (Eds.), *Handbook of Individual Differences in Social Behavior* (pp. 129–146). The Guilford Press: New York

Worth, N. C. & Book, A. A. (2014). Personality and behaviour in a massively multiplayer online role-playing game. *Computers in Human Behavior, 38*, 322-330. doi: 10.1016/j.chb.2014.06.009

Worth, N. C. & Book, A. S. (2015). Dimensions of video game behavior and their relationships with personality. *Computers in Human Behavior, 50*, 132-140. doi: 10.1016/j.chb.2015.03.056

Zeigler-Hill, V. & Monica, S. (2015). The HEXACO model of personality and video game preferences. *Entertainment Computing, 11*, 21-26. doi: 10.1016/j.entcom.2015.08.001

Zuckerman, M. (1999). *Vulnerability to psychopathology: A biosocial model.* Washington, DC: American Psychological Association.

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