Online Gaming and Personality: Explaining Gamers' Cheating Intention

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Abstract

Cheating in online games poses a risk to game publishers, as it deters other gamers and reduces revenues. These facts make it essential for game publishers to understand 'who' in the sense of gamers with what personalities have cheating intentions. Building on psychology research, we draw on (a) the big five personality traits and (b) the dark triad personality traits to explain how these reflect gamers' personalities and together lead to cheating intentions. Following a configurational approach (N=192), we reveal two configurations leading to high cheating intention and one leading to low cheating intention. We contribute to online gaming research by revealing that gamers with cheating intentions have specific personalities. We advance information systems (IS) personality research by combining broad and dark triad traits to explain divergent behavior like cheating.

Keywords: Online gaming, cheating, big five personality traits, dark triad, fuzzy set qualitative comparative analysis (fsQCA)

1. Introduction

Online gaming proliferated recently, reaching gamer numbers of 3.24 billion globally (Clement, 2021). While this led to revenue of US $38.95 billion in 2021 (Newzoo, 2021), the long-term success of game publishers is threatened by the divergent behavior of gamers (Teng et al., 2012). Practical data indicate that more than one in ten gamers cheat in online games (Irdeto, 2021). For instance, gamers use computer programs in first-person shooters that allow them to consistently hit opponents' bodies or to have an x-ray-like vision to see what happens behind walls (M. Park, 2021). Overall, cheating describes gaining an unfair advantage over opponents in online games by, for instance, running hacks, exploiting glitches, or modifying client infrastructure (Yan & Randell, 2009). Cheating gamers give other gamers the impression that they cannot win an online game, spoiling the fun for them (Zuo et al., 2016). When facing cheating gamers, 29 percent of gamers tend to stop playing an online game, and 48 percent buy less in-game content (Irdeto, 2021), implying lower revenue for game publishers (Schlesinger, 2019). These numbers require game publishers to amplify their efforts in understanding why some gamers cheat and how to avoid that.

Initial information systems (IS) literature in online gaming explains cheating with factors such as perceived behavioral control and hedonic motivation (Sharma et al., 2021). More recently, research shows that personality traits lead to divergent IS use behaviors (Maier et al., 2020; Pflügner et al., 2021), suggesting that individuals with a specific personality show such behaviors. Even though personality traits have not been studied in the field of cheating, some related concepts that point to how gamers consider themselves, e.g., self-efficacy, lead to cheating (Chen & Ong, 2018; Wang et al., 2019). Taking this together, we aim to study how gamers' personality explain their cheating intention.

IS research typically draws on broad personality traits such as the big five personality traits to explain user behavior (Barnett et al., 2015; Dieris-Hirche et al., 2020). Such broad personality traits reflect the core characteristics of personality (McCrae & Costa Jr., 2008). While broad personality traits are generally well-suited to explain behavior, the situation is different for divergent behaviors (van Geel et al., 2017). To explain such behaviors, recent research suggests including traits focusing on the dark side of the personality, e.g., narcissism and psychopathy (Jonason & Sherman, 2020). Taking this as an opportunity, we consider broad personality traits and dark personality traits to understand gamers' cheating intentions in online games. In line with the latest knowledge that IS-related behavior is grounded in multiple personality traits (Pflügner et al., 2021), we ask the following research question:

How do broad and dark personality traits together lead to cheating intention in online games?

To answer this question, we collected survey data from 192 gamers and used a fuzzy set qualitative comparative analysis (fsQCA) following an inductive approach (Y. Park et al., 2020). Drawing on broad personality traits, i.e., big five personality traits (McCrae & Costa Jr., 2008), and dark personality traits, i.e., dark triad (Jonason & Webster, 2010), our results reveal two combinations of those personality traits, i.e., configurations, that lead to high cheating

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intention in online games. In a posthoc analysis, we identify one configuration that leads to low cheating intention in online games. We contribute to research by illuminating how personality leads to gamers' cheating intention. We advance IS personality research by combining broad and dark personality traits leading to cheating.

This paper is structured as follows: In Section 2, we present the status quo of research on cheating in online games and outline IS personality research. In Section 3, we explain our methodological approach. In Section 4, we present our findings. In section 5, we offer the theoretical contributions, practical implications, and limitations, concluding the paper in section 6.

2. Theoretical background

We next review research on cheating in online games and IS literature on personality.

2.1 Cheating in online games

Cheating is defined as any behavior of gamers to gain an unfair advantage (Consalvo, 2007) or achieve a target in online games that they are not supposed to achieve (Yan & Randell, 2009), reflecting a divergent behavior (Sharma et al., 2021; Teng et al., 2012). Research identifies 15 different types of cheating, including manipulating software and hardware on a gaming system, i.e., changing setting files of a game installation or running third-party tools to manipulate network traffic or visualization of games in favor of the gamer. (Duh & Chen, 2009; Yan & Randell, 2009). Gamers justify their cheating by rationalizing and comparing their benefits to community benefits (Chen & Ong, 2018). The more often gamers are exposed to cheating, the more accepted it is within their peer groups (Paay et al., 2018).

Existing work suggests that gamers' moral philosophy (Wu & Chen, 2018), attitude, subjective norms, perceived behavioral control, hedonic motivation, and envy increase cheating intention (Sharma et al., 2021). Further, anonymity increases online game cheating (Chen & Wu, 2015). In contrast, ethical judgment lowers their cheating intention (Sharma et al., 2021) and cheating (Chen & Wu, 2015). Research suggests that male gamers cheat more often than female gamers (Chen & Wu, 2015), and gamers' self-efficacy fosters the intention to stop cheating (Wang et al., 2019). This suggests that individual differences are relevant for explaining cheating. Given that personality traits explain behavior in related contexts (Maier et al., 2020; Pflügner et al., 2021), there is a need to understand how the personality traits of gamers lead to cheating. To explain cheating intention based on gamers' personalities, we next turn to IS personality research.

2.2 IS personality research

Personality is described by personality traits, which lead to individuals' thoughts, feelings, and behavior (McCrae & Costa Jr., 2008). The **big five personality traits** constitute the core characteristics of individual differences. They are commonly understood as stable and situation-independent regarding behavior, feelings, and thoughts. As stable traits, they change little over time and build an essential basis for individuals' behaviors and perceptions (Kandler et al., 2014). The big five personality traits consist of five personality traits (Goldberg, 1981). *Extraversion* describes individuals' tendency to seek stimulation out of social interaction. *Agreeableness* depicts the propensity to cooperate with others. *Conscientiousness* describes individuals' tendency to act organized and in a dutiful manner. *Neuroticism* is the tendency to experience unpleasant emotions such as sadness. *Openness to experience* describes the tendency to prefer novel experiences (McCrae & Costa Jr., 2008).

Previous IS research draws on the big five personality traits to explain behavior in different contexts. For instance, research shows that a high level of conscientiousness, extraversion, and openness fosters the use of e-government portals (Venkatesh et al., 2014). Following this line of argumentation, studies show that a low level of neuroticism and a high level of extraversion and conscientiousness increase the use of course management systems (Barnett et al., 2015). Time spent playing, a high level of neuroticism, depression symptoms, and a high level of conscientiousness predict problematic online game behavior such as addiction in competitive first-person shooters and massively multiplayer online role play games (Dieris-Hirche et al., 2020), which is consistent with suggestions that personality traits guide gamers' addiction (Maier, 2020).

In addition to broad traits, research has identified the **dark triad** as important for behavior (Tang et al., 2020). The dark triad represents three specific socially undesirable traits (Paulhus & Williams, 2002): *Machiavellianism* characterizes a manipulative personality. *Narcissism* is defined by superiority, dominance, and entitlement. *Psychopathy* includes thrill-seeking and impulsivity paired with low empathy and anxiety (Jonason & Webster, 2010).

Previous research draws on the dark triad to explain divergent behavior (Tang et al., 2020). For instance, individuals with a high level of dark triad personality traits tend to send insulting or threatening

messages and post aggressive comments (Bogolyubova et al., 2018). While a high level of psychopathy increases visual and textual cyberbullying behavior (Goodboy & Martin, 2015), a high level of narcissism lets individuals take selfies and post them on social media (McCain et al., 2016). In the context of phishing, attackers' levels of machiavellianism increase their efforts in phishing, while victims' levels of narcissism increase the success of a phishing attempt (Curtis et al., 2018).

Previous IS research primarily focused on the big five personality traits or the dark triad. Initial research studying the big five personality traits and the dark triads reveals an interplay between the big five personality traits and the dark triads (Koehn et al., 2019). For instance, high levels of machiavellianism relate positively to neuroticism, and high levels of narcissism relate positively to openness, extraversion, and neuroticism, while narcissism relates negatively to agreeableness (Balakrishnan et al., 2019). Despite that, research suggests that combining the big five personality traits and the dark triads helps explain different divergent behaviors (van Geel et al., 2017). Among others, studies show that a high level of narcissism and psychopathy increase bullying (van Geel et al., 2017). Individuals with a high level of psychopathy and neuroticism are also more likely to cheat on their partners (Timmermans et al., 2018). In the same line of argumentation, research shows that a high level of agreeableness decreases vaccine hesitancy, while a high level of conscientiousness, narcissism, and psychopathy increases it (Howard, 2022). In sum, studies underscore the merit of considering the big five personality traits and the dark triad traits together, suggesting that combining them yields higher explanatory power for divergent behaviors than focusing only on the big five personality traits or the dark triads (Koehn et al., 2019; S.-L. Lee, 2019).

In line with this, we suggest that IS research profits from combining the big five personality traits with the dark triad to explain divergent IS behavior, such as cheating intention in online games (Figure 1).

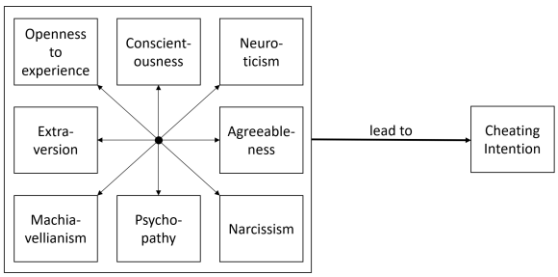

Figure 1. Research approach.

3. Methodology

We next describe the data collection and measurement items, the measurement model, and the data analysis using fsQCA.

3.1 Data collection and measurement items

We conducted an online survey to collect data. Since we aim to explain cheating intentions, we invited gamers that play online games in our study. We advertised for participants in different subreddits related to various competitive online games (e.g., r/leagueoflegends, r/GlobalOffensive, r/RocketLeague) and gaming in general (e.g., r/videogames).

309 participants completed the survey. We removed 85 participants because they did not specify which game they played online. We also removed 19 participants who completed the survey in less than three minutes, which was too fast compared to the mean value of nine minutes and 52 seconds. After removing 13 more participants who skipped at least three questions, our final sample comprised 192 online gamers. Following the sample size requirements for QCA, we tested the ratio of observations to conditions, which needs to be lower than 0.20 (Marx, 2010). Since we examine eight conditions with 192 observations, the ratio is 0.04, showing that our sample size is sufficient. We report the demographics in Table 1.

Table 1. Demographics of 192 online gamers.

Age (in percent)		**Biological sex** (in percent)	
<20	9.38	Male	65.63
20 - 29	44.79	Female	33.33
30 - 39	19.79	Other	1.04
40 - 49	9.38	**Top 3 Online Games** (in percent)	
>49	16.66	League of Legends	17.19
		FIFA	16.15
		StarCraft 2	11.46

We measured the big five personality traits and dark triad based on established measures from previous research (John et al., 1991; Jonason & Webster, 2010). To measure cheating intention, we adapted measures focusing on cheating intention in exams to the online gaming context (Beck & Ajzen, 1991). For example, we changed "If I had the opportunity, I would cheat on a test or exam." to "If I had the opportunity, I would cheat in an online match." We measured the big five personality traits with a five-point Likert scale from "strongly disagree" (1) to "strongly agree" (5) and the dark triad and cheating intention with a seven-point Likert scale from "strongly disagree" (1) to "strongly agree" (7) (Table 3).

We used Harman's single factor test to check for common method bias. Results indicated that 20.39 of the variance is explained by a single factor, which is below the recommended threshold of 0.5 (Podsakoff & Organ, 1986). We also examined the correlation matrix for extremely high correlations (>0.90) and found that all correlations were below the threshold.

3.2 Measurement model

We tested the used measures for indicator reliability, construct reliability, and discriminant validity (Mattke et al., 2021). We dropped one item of psychopathy, narcissism, and cheating intention due to low loading. As all remaining items of the reflective measures exceed the threshold of 0.707 (Carmines & Zeller, 1979) (Table 3 in the Appendix), we confirm indicator reliability. The composite reliability (CR) of all reflective measures exceeds 0.70, and the average variance extracted (AVE) exceeds 0.50, so we confirm construct reliability (Table 4. Reflective measurement items. in the Appendix). The square root of the AVE of all reflective measures is greater than the corresponding construct correlations, so discriminant validity is given (Fornell & Larcker, 1981). We provide the descriptive statistics in Table 3 in the Appendix. To validate the formative measures of the big five personality traits, we assessed their variance inflation factors (VIF). The multicollinearity test revealed that the VIF values range from 1.08 to 1.70 (Table 5. Formative measurement items. in the Appendix), which is considerably below the suggested threshold of 3.3 (Diamantopoulos & Siguaw, 2006).

In sum, we state that the measurement model is valid and reliable, so we proceed with the analysis.

3.3 Data analysis using fsQCA

Following an inductive approach (Y. Park et al., 2020), we used fuzzy set qualitative comparative analysis (fsQCA) (Ragin, 2000). fsQCA is an established configurational approach for studying behavior in the IS discipline (Sun et al., 2021), relying on set theory to analyze how multiple conditions together lead to an outcome in the form of configurations. In this study, the big five personality traits and dark triad are the conditions, and cheating intention is the outcome. We used fsQCA to analyze for necessary conditions (i.e., all resulting configurations contain the condition) and sufficient configurations (i.e., whenever a configuration exists, the outcome exists as well) for high cheating intention. In a post-hoc analysis, we analyzed for necessary conditions and sufficient configurations for low cheating intention. fsQCA draws on fuzzy set memberships, requiring the conditions and outcomes to be expressed in values that range from zero to one. A fuzzy set membership of zero indicates that a condition applies to a low level. In contrast, a value of one indicates that it applies to a high level. For instance, a fuzzy set membership of 0.2 for cheating intention indicates that online gamers only intend to cheat to a relatively low level. In contrast, a fuzzy set membership of 0.8 indicates they intend to cheat to a relatively high level. We next describe the three steps of fsQCA: calibration, analysis for necessary conditions, and analysis for sufficient configurations. For all steps, we used the QCA package for R (Duşa, 2019).

Calibration. Following previous fsQCA studies in IS research (Meier et al., 2022), we calculated the mean of each condition. We then used the direct calibration to transform the mean values into fuzzy set memberships. Since we used a five-point Likert scale for the big five personality traits and a seven-point Likert scale for the dark triad personality traits, we had two sets of anchors. For the big five personality traits, we used one for full-non-membership, three for the cross-over point, and five for full-membership. For the dark triad and cheating intention, we used one for full-non-membership, four as cross-over value, and seven for full-membership.

Analysis for necessary conditions. We used fsQCA to analyze for necessary conditions for high and low cheating intention. Necessary conditions must exceed a consistency threshold of 0.9, a coverage threshold of 0.6, and a relevance of necessity (RoN) threshold of 0.6 (Thomann et al., 2018). Consistency explains the degree to which individuals with the same condition share the same outcome. The coverage explains how much of the sample a condition covers. The RoN explains how relevant a condition is as a necessary condition. A high RoN indicates that a condition is highly relevant, so we avoid trivial necessary conditions (Ragin, 2006).

Analysis for sufficient configurations. We then used fsQCA to analyze sufficient configurations for high and low cheating intention. We created a truth table containing all logically possible personality trait configurations. As we analyzed eight personality traits, our truth table contained 2^8=256 configurations. We removed all configurations with less than five observations by applying a frequency threshold of five, which is common in IS research (Y. Park et al., 2020). We applied a raw consistency threshold of 0.75 (Ragin, 2006), setting the minimum degree of how consistent a configuration must explain an outcome. We then removed configurations with a proportional reduction

of inconsistency (PRI) value lower than 0.75 (Mattke et al., 2021), thus avoiding configurations that relate to high and low cheating intention. We simplified the remaining truth table using the Quine McCluskey algorithm, resulting in a solution that includes sufficient configurations explaining the outcome. Using the Quine McCluskey algorithm, "don't care situations" can emerge, which refers to conditions that can either be high or low in a specific sufficient configuration and are thus irrelevant.

4. Results

We next present the results of the analyses for necessary conditions and sufficient configurations and validate the robustness of our solution.

4.1 Necessary conditions and sufficient configurations

The analysis revealed no necessary conditions for high cheating intention. The analysis for sufficient configurations revealed two configurations that lead to high cheating intention. In a posthoc analysis, we revealed no necessary conditions for low cheating intention and one sufficient configuration for low cheating intention. We provide a graphical representation of our results in Table 2.

Table 2. Sufficient configurations for the cheating intention.

	High cheating intention		**Low cheating intention**
	Disturbing cheater	Inconspicuous cheater	Diligent non-cheater
Extraversion	●	●	⊗
Agreeableness		●	●
Conscientiousness		●	●
Neuroticism	●		⊗
Openness	●	●	●
Machiavellianism	●	●	⊗
Psychopathy	●	●	⊗
Narcissism	●	●	⊗
Raw coverage	0.55	0.57	0.41
Unique coverage	0.04	0.05	0.41
Consistency	0.92	0.91	0.92
Solution coverage	0.60		0.41
Solution consistency	0.91		0.92

Note: Black circles (●) show personality traits to a high level, and white crossed-out circles (⊗) show personality traits to a low level. Blank spaces indicate "don't care" situations.

The raw coverage describes the proportion of configurations that a specific sufficient configuration covers. The unique coverage describes the proportion uniquely covered by a specific configuration without the proportions covered by other configurations with the same outcome (Ragin, 2006; Schneider & Wagemann, 2010). The three sufficient configurations exceed the minimum required consistency of 0.75. The raw coverage ranging from 0.41 to 0.57 shows that the high and low cheating intention solutions have high explanatory power. The unique coverage ranging from 0.04 to 0.41 shows that each configuration leads to cheating intention uniquely. Solution coverage and consistency reflect the overall quality of our solutions (Ragin, 2006). The solution coverages are 0.60 and 0.41, and the solution consistencies are 0.91 and 0.92, showing that the solutions have high explanatory power.

The first sufficient configuration for a high cheating intention in online games describes gamers with a high level of extraversion, neuroticism, openness, machiavellianism, psychopathy, and narcissism. Agreeableness and conscientiousness are not relevant to these gamers' cheating intentions. Since they have a high cheating intention due to, among others, a high level of extraversion and neuroticism, we label them *disturbing cheaters*.

The second sufficient configuration for a high cheating intention in online games shows gamers with a high level of extraversion, agreeableness, conscientiousness, openness, machiavellianism, psychopathy, and narcissism. Neuroticism is not relevant to these gamers' cheating intentions. As these gamers have a high cheating intention despite their high level of agreeableness and conscientiousness, we label them *inconspicuous cheaters*.

The sufficient configuration for a low cheating intention in online games depicts gamers with a high level of agreeableness, conscientiousness, and openness and a low level of extraversion, neuroticism, machiavellianism, psychopathy, and narcissism. Since these gamers have a low cheating intention due to, among others, a high level of conscientiousness and a low level of machiavellianism, psychopathy, and narcissism, we label them *diligent non-cheaters*.

4.2 Validation and robustness of results

We tested the sufficient configurations for sensitivity to the sample and sensitivity to calibration (Mattke et al., 2021). To test for sensitivity to the sample, we increased the frequency threshold to six, which means that we removed configurations with less than six observations. The analysis revealed substantially the same results. We evaluated for

sensitivity to calibration by changing the calibration anchors for the big five personality traits (minimum value = 2, mean value = 3, maximum value = 4) and the dark triad and cheating intention (minimum value = 2, mean value = 4, maximum value = 6), leading to the same configurations. In sum, we conclude that our results are robust.

5. Discussion

Cheating in online games threatens game publishers' revenues and long-term success, as it can deter fair gamers (Irdeto, 2021). To explain gamers' cheating intentions, we combine broad and dark personality traits. Using fsQCA to analyze data of 192 gamers who play online games competitively, we reveal two configurations that lead to high cheating intention and one configuration that leads to low cheating intention. We next craft theoretical explanations in the form of propositions for each identified configuration.

Disturbing cheater. Individuals with a high level of extraversion are sociable and ambitious, participating passionately in social activities (Ok, 2021). Online gaming depicts a digitally mediated competitive social interaction with other gamers (Griffiths et al., 2003) shaped by rivalry (Behnke et al., 2020), so extraverted gamers intend to cheat to get an advantage to compete with and surpass other gamers. Individuals with a high level of neuroticism are more likely to cheat on their partners (Timmermans et al., 2018). Their tendency to engage in divergent behavior is also reflected in the online gaming context, as our findings confirm that gamers with a high level of neuroticism intend to cheat in online games. While previous work has not identified that a high level of openness can lead to divergent behavior (Gervasi et al., 2017), we reveal that it leads to cheating intention in combination with other personality traits. As gamers with a high level of machiavellianism tend to be manipulative (Tang et al., 2020), they intend to manipulate online games to gain unfair advantages (Consalvo, 2007). Similarly, gamers with high narcissism try to dominate others (Kircaburun et al., 2018) which is in line with their cheating to surpass other gamers. Gamers with a high level of psychopathy are characterized by seeking thrill (Tang et al., 2020), so they cheat because they enjoy showing divergent behavior without being caught by other gamers and game publishers. Taking this together, we suggest the following proposition (P):

P1: Gamers have a high cheating intention if they have a high level of extraversion, neuroticism, openness, machiavellianism, psychopathy, and narcissism.

Inconspicuous cheater. Like disturbing cheaters, these gamers are characterized by a high level of extraversion, openness, machiavellianism, narcissism, and psychopathy. Despite these similarities, whether they have a high level of neuroticism or not is not relevant to these gamers' cheating intentions. Notably, these gamers are highly agreeable, reflecting their tendency to seek cooperation with others (McCrae & Costa Jr., 2008). Following the line of argumentation that cheating in online games depicts a social activity (Ok, 2021), our findings indicate that agreeable gamers consider cheating in terms of participating in a social activity with other gamers, which are often their family and friends (Consalvo & Vazquez, 2014). In combination with a high level of conscientiousness, these gamers intend to cheat in a planned and thorough manner to align and cooperate with other cheating gamers, so we propose:

P2: Gamers have a high cheating intention if they have a high level of extraversion, agreeableness, conscientiousness, openness, machiavellianism, psychopathy, and narcissism.

Diligent non-cheater. Contrary to disturbing and inconspicuous cheaters, diligent non-cheaters have a low level of extraversion, neuroticism, and all three dark triad traits. This is in line with research showing that extraversion increases divergent behavior, such as problematic game use, which is the tendency to spend more time and energy on games than planned (Ok, 2021), and underlines that there are gamers who decline support from others because they consider it as cheating (Consalvo, 2007). We supplement studies showing that a high level of neuroticism plays an essential role in predicting internet game disorder while playing games, which causes symptoms similar to symptoms of substance abuse (Gervasi et al., 2017) by suggesting that a low level of neuroticism leads to low cheating intention based on the other personality traits. We also show that a low level of dark triad leads to low cheating intention, which extends previous research suggesting that a high level of dark triad leads to divergent behavior (Gervasi et al., 2017). We propose:

P3: Gamers have a low cheating intention if they have a low level of extraversion, neuroticism, machiavellianism, psychopathy, and narcissism, and a high level of agreeableness, conscientiousness, and openness.

5.1 Theoretical contribution

Our findings contribute to online gaming research and IS personality research.

Previous online gaming research explains cheating based on gamers' perceptions and thoughts (Sharma et

al., 2021). We complement those insights by showing how gamers' personalities lead to cheating intentions. We reveal that two configurations of personality traits predispose gamers to cheat (disturbing cheater, inconspicuous cheater). In contrast, one configuration predisposes them to not cheat (diligent non-cheater). With this, we contribute by offering a more nuanced understanding of why gamers cheat. Apart from perceptions and thoughts, as suggested in previous research (S. J. Lee et al., 2021), personality predisposes some gamers to cheat when playing online games. This knowledge is relevant as it indicates that these gamers will cheat irrespectively of their perceptions, thoughts, and what their social environment expects from them.

IS personality research explains how broad personality traits, e.g., extraversion, influence behavior (Barnett et al., 2015; Venkatesh et al., 2014). We extend these insights by considering dark personality traits such as psychopathy. Following the suggestion of research to integrate broad personality traits and dark personality traits to provide insights into divergent behavior (Alper et al., 2021; Balakrishnan et al., 2019), we study how configurations of them together lead to cheating intention. While our findings show that all users with high cheating intention have a high level of all dark personality traits, the broad personality traits reveal two equifinal types of gamers with high cheating intention. This suggests that considering only the dark personality traits to explain divergent behavior, such as online game cheating, leads to oversimplified and potentially misleading results, as it would not have shown that different gamers exist with the same high cheating intention. This finding underlines the need to study broad and dark personality traits to explain divergent behavior, such as cheating in online games.

5.2 Implications for practice

We use our findings to provide practical recommendations for game publishers to act on cheating in online games, which helps them sustain gamer numbers and revenues in the long-term.

Game publishers should try to identify gamers predisposed to cheating, e.g., by applying text mining methods to examine gamers' personalities based on their communication regarding insulting, threatening, or aggressive messages (Bogolyubova et al., 2018). Suppose gamers at the risk of cheating can be identified early. Game publishers could then offer game servers or modes to bring cheating gamers together based on their personalities. This would allow cheating gamers to have fun cheating, while non-cheating gamers would be able to enjoy online games as intended by the rules. In addition, game publishers could focus their attention on gamers more likely to cheat when monitoring regular game servers and modes. This way, they can take swift action in case of cheating (e.g., ban cheaters) to prevent cheaters from spoiling the fun for other gamers.

5.3 Limitations and future research

This study has some limitations. Given initial evidence that gamers vary in which behavior they identify as cheating (Consalvo, 2007; Paay et al., 2018), some participants who indicated a low cheating intention might engage in online gaming practices that game publishers would identify as cheating. We suggest future research draws from a game publisher's description of practices considered cheating in a specific online game to study cheating. This study explains gamers' cheating intentions across online game genres. Future research should study whether cheating intentions differ based on specific online game genres, e.g., sports games (Siuda, 2022) or first-person shooters (Hedlund, 2021). Further, we study cheating intention, which is a suited estimator for cheating behavior (Sharma et al., 2021). While this offers insights into why gamers would cheat if they had the chance to do it, it does not consider that there might be technical barriers that prevent gamers with high cheating intentions from actually cheating.

6. Conclusion

Cheating poses risks to game publishers. To help game publishers act on cheating and secure their revenues, we reveal that two sufficient configurations lead to high cheating intention, and one leads to low cheating intention. We use these findings to develop propositions for high and low cheating intention. We advance research by going beyond perceptions and thoughts to show that gamers' personality predisposes them to cheat. We contribute to research by showing that combinations of broad and dark personality traits are valuable in explaining cheating.

7. References

Alper, S., Bayrak, F., & Yilmaz, O. (2021). All the Dark Triad and some of the Big Five traits are visible in the face. *Personality and Individual Differences*, *168*, 110350. https://doi.org/10.1016/j.paid.2020.110350

Balakrishnan, V., Khan, S., Fernandez, T., & Arabnia, H. R. (2019). Cyberbullying detection on twitter using Big Five and Dark Triad features. *Personality and Individual Differences*, *141*, 252–257. https://doi.org/10.1016/j.paid.2019.01.024

Barnett, T., Pearson, A. W., Pearson, R., & Kellermanns, F. W. (2015). Five-factor model personality traits as predictors of perceived and actual usage of technology. *European Journal of Information Systems*, *24*(4), 374–390. https://doi.org/10.1057/ejis.2014.10

Beck, L., & Ajzen, I. (1991). Predicting dishonest actions using the theory of planned behavior. *Journal of Research in Personality*, *25*(3), 285–301. https://doi.org/10.1016/0092-6566(91)90021-H

Behnke, M., Kosakowski, M., & Kaczmarek, L. D. (2020). Social challenge and threat predict performance and cardiovascular responses during competitive video gaming. *Psychology of Sport and Exercise*, *46*, 101584. https://doi.org/10.1016/j.psychsport.2019.101584

Bogolyubova, O., Panicheva, P., Tikhonov, R., Ivanov, V., & Ledovaya, Y. (2018). Dark personalities on Facebook: Harmful online behaviors and language. *Computers in Human Behavior*, *78*, 151–159. https://doi.org/10.1016/j.chb.2017.09.032

Carmines, E. G., & Zeller, R. A. (1979). *Reliability and validity assessment*. Sage Publications.

Chen, V. H. H., & Ong, J. (2018). The rationalization process of online game cheating behaviors. *Information, Communication & Society*, *21*(2), 273–287. https://doi.org/10.1080/1369118X.2016.1271898

Chen, V. H. H., & Wu, Y. (2015). Group identification as a mediator of the effect of players' anonymity on cheating in online games. *Behaviour & Information Technology*, *34*(7), 658–667. https://doi.org/10.1080/0144929X.2013.843721

Clement, J. (2021). *Number of video gamers worldwide in 2021, by region*. https://www.statista.com/statistics/293304/number-video-gamers/

Consalvo, M. (2007). *Cheating: Gaining Advantage in Videogames*. The MIT Press. https://doi.org/10.7551/mitpress/1802.001.0001

Consalvo, M., & Vazquez, I. S. (2014). Cheating, Social Network Games and the Role of Platforms. *2014 47th Hawaii International Conference on System Sciences*, 1687–1694. https://doi.org/10.1109/HICSS.2014.216

Curtis, S. R., Rajivan, P., Jones, D. N., & Gonzalez, C. (2018). Phishing attempts among the dark triad: Patterns of attack and vulnerability. *Computers in Human Behavior*, *87*, 174–182. https://doi.org/10.1016/j.chb.2018.05.037

Diamantopoulos, A., & Siguaw, J. A. (2006). Formative Versus Reflective Indicators in Organizational Measure Development: A Comparison and Empirical Illustration. *British Journal of Management*, *17*(4), 263–282. https://doi.org/10.1111/j.1467-8551.2006.00500.x

Dieris-Hirche, J., Pape, M., te Wildt, B. T., Kehyayan, A., Esch, M., Aicha, S., Herpertz, S., & Bottel, L. (2020). Problematic gaming behavior and the personality traits of video gamers: A cross-sectional survey. *Computers in Human Behavior*, *106*, 106272. https://doi.org/10.1016/j.chb.2020.106272

Duh, H. B.-L., & Chen, V. H. H. (2009). Cheating Behaviors in Online Gaming. In A. A. Ozok & P. Zaphiris (Eds.), *Online Communities and Social Computing* (Vol. 5621, pp. 567–573). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-02774-1_61

Duşa, A. (2019). *QCA with R*. Springer International Publishing. https://doi.org/10.1007/978-3-319-75668-4

Fornell, C., & Larcker, D. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *American Marketing Association*. http://www.jstor.com/stable/3151312

Gervasi, A. M., La Marca, L., Costanzo, A., Pace, U., Guglielmucci, F., & Schimmenti, A. (2017). Personality and Internet Gaming Disorder: A Systematic Review of Recent Literature. *Current Addiction Reports*, *4*(3), 293–307. https://doi.org/10.1007/s40429-017-0159-6

Goldberg, L. R. (1981). Unconfounding situational attributions from uncertain, neutral, and ambiguous ones: A psychometric analysis of descriptions of oneself and various types of others. *Journal of Personality and Social Psychology*, *41*(3), 517–552. https://doi.org/10.1037/0022-3514.41.3.517

Goodboy, A. K., & Martin, M. M. (2015). The personality profile of a cyberbully: Examining the Dark Triad. *Computers in Human Behavior*, *49*, 1–4. https://doi.org/10.1016/j.chb.2015.02.052

Griffiths, M. D., Davies, M. N. O., & Chappell, D. (2003). Breaking the Stereotype: The Case of Online Gaming. *CyberPsychology & Behavior*, *6*(1), 81–91. https://doi.org/10.1089/109493103321167992

Hedlund, D. P. (2021). A Typology of Esport Players. *Journal of Global Sport Management*, 1–18. https://doi.org/10.1080/24704067.2021.1871858

Howard, M. C. (2022). The good, the bad, and the neutral: Vaccine hesitancy mediates the relations of Psychological Capital, the Dark Triad, and the Big Five with vaccination willingness and behaviors. *Personality and Individual Differences*, *190*, 111523. https://doi.org/10.1016/j.paid.2022.111523

Irdeto global gaming survey report. (2021). Irdeto. https://resources.irdeto.com/media/irdeto-global-gaming-survey-report

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *Big Five Inventory* [Data set]. American Psychological Association. https://doi.org/10.1037/t07550-000

Jonason, P. K., & Sherman, R. A. (2020). Personality and the perception of situations: The Big Five and Dark Triad traits. *Personality and Individual Differences*, *163*, 110081. https://doi.org/10.1016/j.paid.2020.110081

Jonason, P. K., & Webster, G. D. (2010). The dirty dozen: A concise measure of the dark triad. *Psychological Assessment*, *22*(2), 420–432. https://doi.org/10.1037/a0019265

Kandler, C., Zimmermann, J., & McAdams, D. P. (2014). Core and Surface Characteristics for the Description and Theory of Personality Differences and Development. *European Journal of Personality*, *28*(3), 231–243. https://doi.org/10.1002/per.1952

Kircaburun, K., Jonason, P. K., & Griffiths, M. D. (2018). The Dark Tetrad traits and problematic online gaming: The mediating role of online gaming motives and moderating role of game types. *Personality and Individual Differences*, *135*, 298–303. https://doi.org/10.1016/j.paid.2018.07.038

Koehn, M. A., Jonason, P. K., & Davis, M. D. (2019). A person-centered view of prejudice: The Big Five, Dark Triad, and prejudice. *Personality and Individual Differences*, *139*, 313–316. https://doi.org/10.1016/j.paid.2018.11.038

Lee, S. J., Jeong, E. J., Lee, D. Y., & Kim, G. M. (2021). Why Do Some Users Become Enticed to Cheating in Competitive Online Games? An Empirical Study of Cheating Focused on Competitive Motivation, Self-Esteem, and Aggression. *Frontiers in Psychology*, *12*, 768825. https://doi.org/10.3389/fpsyg.2021.768825

Lee, S.-L. (2019). Predicting SNS addiction with the Big Five and the Dark Triad. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *13*(1). https://doi.org/10.5817/CP2019-1-3

Maier, C. (2020). Overcoming pathological IT use: How and why IT addicts terminate their use of games and social media. *INTERNATIONAL JOURNAL OF INFORMATION MANAGEMENT*, *51*. https://doi.org/10.1016/j.ijinfomgt.2019.102053

Maier, C., Mattke, J., Pflügner, K., & Weitzel, T. (2020). Smartphone use while driving: A fuzzy-set qualitative comparative analysis of personality profiles influencing frequent high-risk smartphone use while driving in Germany. *International Journal of Information Management*, *55*, 102207. https://doi.org/10.1016/j.ijinfomgt.2020.102207

Marx, A. (2010). Crisp-set qualitative comparative analysis (csQCA) and model specification: Benchmarks for future csQCA applications. *International Journal of Multiple Research Approaches*, *4*(2), 138–158. https://doi.org/10.5172/mra.2010.4.2.138

Mattke, J., Maier, C., Weitzel, T., & Thatcher, J. B. (2021). Qualitative comparative analysis in the information systems discipline: A literature review and methodological recommendations. *Internet Research*, *31*(5), 1493–1517. https://doi.org/10.1108/INTR-09-2020-0529

McCain, J. L., Borg, Z. G., Rothenberg, A. H., Churillo, K. M., Weiler, P., & Campbell, W. K. (2016). Personality and selfies: Narcissism and the Dark Triad. *Computers in Human Behavior*, *64*, 126–133. https://doi.org/10.1016/j.chb.2016.06.050

McCrae, R. R., & Costa Jr., P. T. (2008). The five-factor theory of personality. In *Handbook of personality: Theory and research, 3rd ed.* (pp. 159–181). The Guilford Press.

Meier, M., Maier, C., Mattke, J., & Weitzel, T. (2022). Esports: Explaining Willingness to Pay for Streaming Services. *Communications of the Association for Information Systems*, *50*, 286–307. https://doi.org/10.17705/1CAIS.05011

Newzoo. (2021). *Top Public Video Game Companies By Revenue*. https://newzoo.com/insights/rankings/top-25-companies-game-revenues/

Ok, C. (2021). Extraversion, loneliness, and problematic game use: A longitudinal study. *Personality and Individual Differences*, *168*, 110290. https://doi.org/10.1016/j.paid.2020.110290

Paay, J., Kjeldskov, J., Internicola, D., & Thomasen, M. (2018). Motivations and practices for cheating in Pokémon GO. *Proceedings of the 20th International Conference on Human-Computer Interaction with Mobile Devices and Services*, 1–13. https://doi.org/10.1145/3229434.3229466

Park, M. (2021, February 1). *How to spot Call of Duty: Warzone cheats and hacks*. https://www.pcgamer.com/call-of-duty-warzone-hacks-cheats-pc/

Park, Y., Fiss, P. C., & El Sawy, O. A. (2020). Theorizing the Multiplicity of Digital Phenomena: The Ecology of Configurations, Causal Recipes, and Guidelines for Applying QCA. *MIS Quarterly*, *44*(4), 1493–1520. https://doi.org/10.25300/MISQ/2020/13879

Paulhus, D. L., & Williams, K. M. (2002). The Dark Triad of personality: Narcissism, Machiavellianism, and psychopathy. *Journal of Research in Personality*, *36*(6), 556–563. https://doi.org/10.1016/S0092-6566(02)00505-6

Pflügner, K., Maier, C., Mattke, J., & Weitzel, T. (2021). Personality Profiles that Put Users at Risk of Perceiving Technostress: A Qualitative Comparative Analysis with the Big Five Personality Traits. *Business & Information Systems Engineering*, *63*(4), 389–402. https://doi.org/10.1007/s12599-020-00668-7

Podsakoff, P. M., & Organ, D. W. (1986). Self-Reports in Organizational Research: Problems and Prospects. *Journal of Management*, *12*(4), 531–544. https://doi.org/10.1177/014920638601200408

Ragin, C. C. (2000). *Fuzzy-set social science*. University of Chicago Press.

Ragin, C. C. (2006). Set Relations in Social Research: Evaluating Their Consistency and Coverage. *Political Analysis*, *14*(3), 291–310. https://doi.org/10.1093/pan/mpj019

Schlesinger, J. (2019). *Gaming the game: Popular video games can be vulnerable to hackers*. https://www.cnbc.com/2019/10/25/gaming-the-game-popular-video-games-can-be-vulnerable-to-hackers.html

Schneider, C. Q., & Wagemann, C. (2010). Standards of Good Practice in Qualitative Comparative Analysis (QCA) and Fuzzy-Sets. *Comparative Sociology*, *9*(3), 397–418. https://doi.org/10.1163/156913210X12493538729793

Sharma, R., Singh, G., & Sharma, S. (2021). Competitors' envy, gamers' pride: An exploration of gamers' divergent behavior. *Psychology & Marketing*, *38*(6), 965–980. https://doi.org/10.1002/mar.21469

Siuda, P. (2022). *Microtransaction politics in FIFA Ultimate Team: Game fans, Twitch streamers, and Electronic Arts* [Preprint]. Open Science Framework. https://doi.org/10.31219/osf.io/xpvuk

Sun, Y., Wang, N., & Shen, X.-L. (2021). Calculus interdependency, personality contingency, and causal asymmetry: Toward a configurational privacy calculus model of information disclosure. *Information & Management*, *58*(8), 103556. https://doi.org/10.1016/j.im.2021.103556

Tang, W. Y., Reer, F., & Quandt, T. (2020). The interplay of gaming disorder, gaming motivations, and the dark triad. *Journal of Behavioral Addictions*, *9*(2), 491–496. https://doi.org/10.1556/2006.2020.00013

Teng, C., Tseng, F., Chen, Y., & Wu, S. (2012). Online gaming misbehaviours and their adverse impact on other gamers. *Online Information Review*, *36*(3), 342–358. https://doi.org/10.1108/14684521211241387

Thomann, E., van Engen, N., & Tummers, L. (2018). The Necessity of Discretion: A Behavioral Evaluation of Bottom-Up Implementation Theory. *Journal of Public Administration Research and Theory*, *28*(4), 583–601. https://doi.org/10.1093/jopart/muy024

Timmermans, E., De Caluwé, E., & Alexopoulos, C. (2018). Why are you cheating on tinder? Exploring users' motives and (dark) personality traits. *Computers in Human Behavior*, *89*, 129–139. https://doi.org/10.1016/j.chb.2018.07.040

van Geel, M., Goemans, A., Toprak, F., & Vedder, P. (2017). Which personality traits are related to traditional bullying and cyberbullying? A study with the Big Five, Dark Triad and sadism. *Personality and Individual Differences*, *106*, 231–235. https://doi.org/10.1016/j.paid.2016.10.063

Venkatesh, V., Sykes, T. A., & Venkatraman, S. (2014). Understanding e-Government portal use in rural India: Role of demographic and personality characteristics: e-Government portal use. *Information Systems Journal*, *24*(3), 249–269. https://doi.org/10.1111/isj.12008

Wang, L., Fan, L., & Bae, S. (2019). How to persuade an online gamer to give up cheating? Uniting elaboration likelihood model and signaling theory. *Computers in Human Behavior*, *96*, 149–162. https://doi.org/10.1016/j.chb.2019.02.024

Wu, Y., & Chen, V. H. H. (2018). Understanding Online Game Cheating: Unpacking the Ethical Dimension. *International Journal of Human–Computer Interaction*, *34*(8), 786–797. https://doi.org/10.1080/10447318.2018.1461757

Yan, J., & Randell, B. (2009). *An Investigation of Cheating in Online Games*. https://doi.org/10.1109/MSP.2009.60

Zuo, X., Gandy, C., Skovertz, J., & Iamnitchi, A. (2016). *Bad Apples Spoil the Fun: Quantifying Cheating Influence in Online Gaming*. 10.

Appendix

Table 3. Descriptive statistics.

	M	Std	EX	AG	CO	NE	OP	MA	PS	NA	CH
EX	3.24	0.62	-								
AG	3.38	0.48	0.14	-							
CO	3.36	0.53	0.28	0.48	-						
NE	2.92	0.60	-0.31	-0.44	-0.48	-					
OP	3.45	0.42	0.10	0.25	0.24	-0.05	-				
MA	4.29	1.62	0.18	-0.42	-0.18	0.17	0.03	0.81			
PS	4.26	1.57	0.17	-0.43	-0.15	0.20	0.02	0.78	0.81		
NA	4.95	1.38	0.29	-0.20	0.07	0.01	0.11	0.58	0.61	0.77	
CH	4.20	2.00	0.25	-0.42	-0.11	0.13	-0.07	0.70	0.68	0.43	0.91

Note: M = mean, Std = standard deviation. Square root of the average variance extracted (AVE) of the reflective measures is listed on the diagonal of bivariate correlations. 'EX' indicates extraversion, 'AG' indicates agreeableness, 'CO' indicates conscientiousness, 'NE' indicates neuroticism, 'OP' indicates openness, 'MA' indicates machiavellianism, 'PS' indicates psychopathy, 'NA' indicates narcissism, and 'CH' indicates cheating intention

Table 4. Reflective measurement items.

Construct	Item	Loading
Machiavellianism (Jonason & Webster, 2010) CA = 0.88 AVE = 0.66 CR = 0.88	I tend to manipulate others to get my way.	0.89
	I have used deceit or lied to get my way.	0.72
	I have used flattery to get my way.	0.82
	I tend to exploit others towards my own end.	0.79
Psychopathy (Jonason & Webster, 2010) CA = 0.84 AVE = 0.65 CR = 0.85	I tend to lack remorse.	0.81
	I tend to not be too concerned with morality or the morality of my actions.	0.78
	I tend to be callous or insensitive.	0.83
	I tend to be cynical.	n.s.*
Narcissism (Jonason & Webster, 2010) CA = 0.81 AVE = 0.59 CR = 0.81	I tend to want others to admire me.	0.78
	I tend to want others to pay attention to me.	0.76
	I tend to seek prestige or status.	0.76
	I tend to expect special favors from others	n.s.*
Cheating intention adapted from (Beck & Ajzen, 1991) CA = 0.90 AVE = 0.83 CR = 0.90	If I had the opportunity, I would cheat in an online match.	0.89
	I would never cheat in an online match. (reverse coded)	n.s.*
	I may cheat in an online match in the future.	0.92

Note: 'CA' indicates Cronbach's α, 'AVE' indicates average variance extracted, 'CR' indicates Composite reliability. We dropped marked items (n.s.*) due to low loadings, indicating non-significance.

Table 5. Formative measurement items.

Construct	Item	VIF
Extraversion (John et al., 1991)	…is talkative.	1.34
	…is reserved. (reverse coded)	1.39
	…is full of energy.	1.47
	…generates a lot of enthusiasm.	1.55
	…tends to be quiet. (reverse coded)	1.70
	…has an assertive personality.	1.18
	...is sometimes shy, inhibited. (reverse coded)	1.70
	…is outgoing, sociable.	1.47
Agreeableness (John et al., 1991)	…tends to find fault with others. (reverse coded)	1.31
	…is helpful and unselfish with others.	1.11
	…starts quarrels with others. (reverse coded)	1.37
	…has a forgiving nature.	1.12
	…is generally trusting.	1.18
	…can be cold and aloof. (reverse coded)	1.36
	…is considerate and kind to almost everyone.	1.25
	…is sometimes rude to others. (reverse coded)	1.35
	…likes to cooperate with others.	1.10
Conscientiousness (John et al., 1991)	…does a thorough job.	1.22
	…can be somewhat careless. (reverse coded)	1.31
	…is a reliable worker.	1.30
	…tends to be disorganized. (reverse coded)	1.43
	…tends to be lazy. (reverse coded)	1.54
	…perseveres until the task is finished.	1.29
	…does things efficiently.	1.16
	…makes plans and follows through with them.	1.28
	…is easily distracted. (reverse coded)	1.45
Neuroticism (John et al., 1991)	…is depressed, blue.	1.65
	…is relaxed, handles stress well. (reverse coded)	1.29
	…can be tense.	1.37
	…worries a lot.	1.54
	…is emotionally stable, not easily upset. (reverse coded)	1.19
	…can be moody.	1.20
	…remains calm in tense situations. (reverse coded)	1.21
	…gets nervous easily.	1.46
Openness (John et al., 1991)	…is original, comes up with new ideas.	1.27
	…is curious about many different things.	1.19
	…is ingenious, a deep thinker.	1.23
	…has an active imagination.	1.30
	…is inventive.	1.22
	…values artistic, aesthetic experiences.	1.14
	…prefers work that is routine. (reverse coded)	1.08
	…likes to reflect, play with ideas.	1.20
	…has few artistic interests. (reverse coded)	1.14
	…is sophisticated in art, music or literature.	1.18