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Mediational role of gaming motives in the associations of the Five Factor Model of personality with weekly and disordered gaming in adolescents

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ABSTRACT

Five Factor Model (FFM) personality dimensions are relevant distal factors for explaining videogaming behaviors that may act through more proximal variables such as motives. However, this mediational role of gaming motives in the relationships between FFM domains and gaming behaviors has not been examined yet. The present study explored direct and indirect effects of the FFM personality traits on weekly and disordered gaming via gaming motives among 364 adolescent players. Structural equation modeling revealed that disordered gaming was directly predicted by conscientiousness and directly and indirectly, via coping motives, by neuroticism. Low agreeableness was associated with disordered gaming through social interaction. On the other hand, low agreeableness presented significant total effects on weekly gaming. The findings suggest risky personality pathways observed in drug use and abuse are also found in regular and disordered gaming such as the negative affect regulation pathway and a possible deviance proneness pathway.

1. Introduction

Videogaming behavior could be conceptualized as a continuum ranging from non-problematic occasional and regular gaming at one end through to problematic excessive and disordered gaming at the other, with disordered gaming leading to psychosocial and functional impairments for the player (Griffiths et al., 2017). The highest prevalence of disordered gaming is found during adolescence (Fam, 2018; Mihara & Higuchi, 2017), and this problematic behavior has been associated with negative outcomes at these ages, such poor academic performance, loneliness, and numerous externalizing and internalizing problems (Lemmens et al., 2011; Müller et al., 2015). Therefore, it is important to further ascertain those psychological factors involved in non-disordered and disordered gaming, such as personality and motives to play (Dreier et al., 2013).

1.1. The Five-Factor Model and videogaming

Nowadays, the most accepted and employed model of personality at the dispositional level is the Big Five or the Five-Factor Model (FFM), a personality structure that captures much of the existing models of

personality and that provides a consensual an integrative descriptive taxonomy (John et al., 2008). The FFM encompasses the basic and biologically-rooted dimensions of neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (McCrae & Costa, 2008). FFM domains have demonstrated to be relevant in a wide variety of life outcomes, including addictive-related behaviors (Soto, 2019).

Accordingly, the FFM has been widely used to study the relationships between personality and disordered gaming among adults. In this population, disordered gaming is mainly related to low conscientiousness and high neuroticism (for two systematic reviews, see Gervasi et al., 2017; Mihara & Higuchi, 2017). The number of studies focused on adolescents is much scarcer, finding that disordered gaming is related to low conscientiousness, and less consistently to extraversion and neuroticism (García-Oliva & Piqueras, 2016; López-Fernández et al., 2020a; Vollmer et al., 2014). Although these studies confirm that personality is linked to gaming behaviors, from a biodispositional approach it could be considered a distal factor that may act through more proximal variables (McCrae & Costa, 2008), such as motives.

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1.2. Motives to play and videogaming

Motives are important both at a theoretical and an applied level. At an applied level, motives are relevant psychological factors where prevention and intervention strategies can be focused (Dreier et al., 2013; Steadman, 2019). At a theoretical level, motives are understood as a key etiological factor that leads to disordered behavior and addictions (Cooper et al., 2016; Kalivas & Volkow, 2005).

Accordingly, a great number of studies have highlighted the importance of gaming motives to explain part of disordered gaming through different approaches and scales (e.g., Sherry et al., 2006; Yee, 2006). Thereby, escapism-coping motives, which are related to play to forget daily problems and improve mood, are the most associated with gaming addiction (Ballabio et al., 2017; Billieux et al., 2013; Király et al., 2015; Kircaburun et al., 2020; Laconi et al., 2017; López-Fernández et al., 2020b; Männikkö et al., 2017; Yee, 2006). Additionally, motives related to gaming competence, such as achievement or competition, have also been associated with disordered use recurrently (Ballabio et al., 2017; Billieux et al., 2013; Király et al., 2015; Kircaburun et al., 2020; Laconi et al., 2017; Männikkö et al., 2017; Yee, 2006). On the other hand, social motives are strongly linked to higher gaming frequency (de Hessele et al., 2021; López-Fernández et al., 2020b; Sherry et al., 2006). Furthermore, such motives present a significant role on disordered gaming in some studies (e.g., López-Fernández et al., 2020b; Männikkö et al., 2017).

1.3. The mediating role of videogaming motives

The mediational role of motives between personality and other addictive behaviors has been well established, such as in drug abuse (e.g., alcohol; Mezquita et al., 2018), in some behavioral addictions such as gambling severity (McGrath et al., 2018) or social networking site addiction (Chen & Roberts, 2019). In the field of videogames, and to our knowledge, the mediational role of motives between FFM domains and gaming has not been examined yet, nor has the association between basic personality domains and gaming motives in adolescents, although this last issue has received certain research attention in adult samples (i.e., de Hessele et al., 2021; Graham & Gosling, 2013; Park et al., 2011). One of the most robust findings in the link between FFM and motives is the relevant role of neuroticism for escape and coping motives (de Hessele et al., 2021). Another consistent finding is the strong relationship between immersion, role-playing or fantasy motives with openness to experience and, to a lesser extent, with neuroticism (de Hessele et al., 2021; Graham & Gosling, 2013; Jeng & Teng, 2008). Extraversion has presented significant associations with achievement motives (Graham & Gosling, 2013; Park et al., 2011), as well as with social motives in some studies (Graham & Gosling, 2013), but surprisingly not in others (de Hessele et al., 2021; Park et al., 2011). Agreeableness has presented inverse associations with competition (de Hessele et al., 2021) and positive significant relationships with social motives (Graham & Gosling, 2013; Park et al., 2011), although other studies found no associations (de Hessele et al., 2021). Agreeableness has also displayed inconsistent associations with escape motives, with both positive (Park et al., 2011) and negative (de Hessele et al., 2021) results. Last, and despite the importance of conscientiousness in disordered gaming, this dimension has not presented consistent associations across studies. This somewhat confusing pattern of associations between FFM and gaming motives may be explained by the great variety of motives assessed in these studies, the different labels used for naming similar motives, or the use of the same labels for referring to different motives (see López-Fernández et al., 2020b). Precisely, the main aim that guided the development of the Videogame Motives Questionnaire (VMQ), the instrument used in the present study, was to develop a new scale of gaming motives in which the most relevant and recurrent motivational components found in the literature were reflected under unified labels that could help towards a more accurate communication in the field of

videogaming motives (López-Fernández et al., 2020b).

Despite the fact that personality is associated with motives for gaming, only a few studies have examined the mediational role of motives between personality-related constructs and disordered gaming in adults. In a first study using the Dark Tetrad personality traits, narcissism and sadism were indirectly associated with disordered gaming through escape and fantasy motives (Kircaburun et al., 2018). Likewise, another study found a partial mediation of escape motives between low emotional intelligence and problematic gaming (Kircaburun et al., 2020). However, to date, the mediating role of gaming motives in the relationship between FFM personality domains and disordered gaming has not been explored yet.

1.4. Objectives

Therefore, the main objective of the present study is to examine the association between FFM personality dimensions and main gaming motives in adolescents and also the mediation role of motives between basic personality domains and regular and disordered gaming. For that purpose, we used the VMQ, a comprehensive questionnaire developed to assess the most relevant and recurrent videogaming motives: recreation, social interaction, coping, violent reward, fantasy, cognitive development, customization, and competition (López-Fernández et al., 2020b). Based on previous findings in the relationships between FFM domains and motives to play, it was expected that neuroticism would be strongly related to coping and fantasy to a lesser extent. Openness would be highly associated with fantasy. Extraversion would display significant links with social interaction, as well as agreeableness, with this last domain also presenting an association with competition motives. In reference to other unexplored links between FFM and motives, such as cognitive development and violent reward motives, some associations were expected to be observed with openness and low agreeableness respectively, as mental challenging games have been associated with openness (López-Fernández et al., 2020a) and violent and competitive games with low agreeableness (Chory & Goodboy, 2011; López-Fernández et al., 2020a). Last, customization motives refer to creating and designing new things in the game, so a relevant role of openness in these motives was also hypothesized.

Regarding mediation effects, and due to insufficient research to establish hypotheses, two fully saturated models were specified in which the final dependent variables were the quantity of videogaming during the week and disordered videogaming. In each path analysis, the big five personality domains were related to each videogaming motive and videogaming outcome (i.e., weekly or disordered videogaming) and each videogaming motive was, in turn, related to the videogaming outcome.

2. Method

2.1. Participants and procedure

The participants were recruited from two high schools in a Spanish urban area. Of 1106 students invited to participate, 364 (69% boys, mean age = 14.97, $SD = 1.11$, aged 13–17) who reported playing at least once a week and answered all the questionnaires were used for the analyses. The adolescents' parents or legal guardians were informed about the study, confidentiality and the data protection procedure, and gave written informed consents.

This research was part of larger study on the psychosocial factors involved in mental health during adolescence. Trained research assistants administered a battery of questionnaires in three sessions and assisted students when necessary. Those students previously authorized by their parents/legal guardians voluntarily completed a socio-demographic survey together with the rest of the questionnaires (see Moya-Higueras et al., 2020 for more details).

2.2. Measures

Personality was assessed using the JS NEO-A60 (Ortet-Walker et al., 2020). This scale assesses the five broad personality domains of the FFM in youths, aged between 12 and 17 years with a total of 60 items, 12 per domain. Items are responded on a 5-point Likert scale (0 = *strongly disagree*; 4 = *strongly agree*).

To assess motives for playing, the VMQ was employed (López-Fernández et al., 2020b). The questionnaire assesses 8 motives frequently found in research with 3 items per dimension using a 5-point Likert scale (0 = *strongly disagree*; 4 = *strongly agree*). The assessed motives were: social interaction (e.g., “I play videogames because I make new friends”); Violent reward (e.g., “Shooting someone in the head in a game is deeply satisfying”); Cognitive development (e.g., “Games make me think”); Fantasy (e.g., “I like feeling that I’m part of a story”); Coping (e.g., “It helps me get rid of stress”); Competition (e.g., “I like to win”); Customization (e.g., “I enjoy customizing things in games”); recreation (e.g., “I have fun”).

Weekly gaming was obtained by asking the number of daily hours of play on a typical day, both during the week (Monday to Thursday) and on weekends (Friday to Wednesday), and then multiplying these daily hours by the number of days of said periods (four and three days, respectively).

For disordered gaming, a Spanish adaptation (López-Fernández et al., 2020a) of pathological gaming scale for adolescents (Gentile, 2009) was used. The scale comprises 11 items assessing addictive symptomatology: withdrawal (e.g., “In the last 12 months how often have you felt restless and/or irritable when trying to reduce or stop playing videogames?”), mood modification, salience, tolerance, conflict and relapse; on a 4-point Likert scale (0 = *never or almost never*; 3 = *almost always or always*).

2.3. Data analyses

Descriptive analyses, Cronbach's alphas and correlation analyses

were conducted using the SPSS statistical package, version 21. Those missing values from participants that represented less than 5% in a questionnaire were replaced with the mean score for the items remaining in that scale. Structural equation models were performed using Mplus 5.21 (Muthen & Muthen, 1998–2015). Specifically, we performed a Path Analysis to estimate the total and indirect effects of personality on disordered and weekly gaming through videogaming motives, controlling for gender and age, and using bias-corrected bootstrapped estimates based on 10,000 bootstrapped samples. To determine statistical significance, 99% bias-corrected bootstrapped confidence intervals not containing zero were used.

3. Results

Descriptive statistics, correlation analyses and Cronbach's alphas for the study variables are shown in the Supplementary material. Fig. 1 displays the models in which disordered gaming and weekly gaming are dependent variables. Although most of the motives presented medium to high correlations with weekly and disordered gaming (see Supplementary Material), when all motives were taken into account simultaneously, only social interaction became the main motivation for weekly gaming, whereas social interaction and coping were the most important motives for disordered gaming. Some noteworthy associations between personality and motives were also found. Thus, neuroticism was related to coping; low agreeableness to violent reward and competition; openness to fantasy, customization and cognitive development; and conscientiousness to customization. Personality also had direct and indirect effects on disordered gaming. Thus, low conscientiousness and neuroticism were directly associated to disordered gaming. In addition, neuroticism was also indirectly related to disordered gaming through coping motives ($\beta = 0.063$ [0.02, 0.13]) demonstrating that coping motives partially mediated the associations of neuroticism with disordered gaming. Last, the indirect effect of agreeableness on disordered gaming through social interaction motives ($\beta = -0.038$ [-0.09, -0.00]) was also significant (for the indirect and total effects of personality on

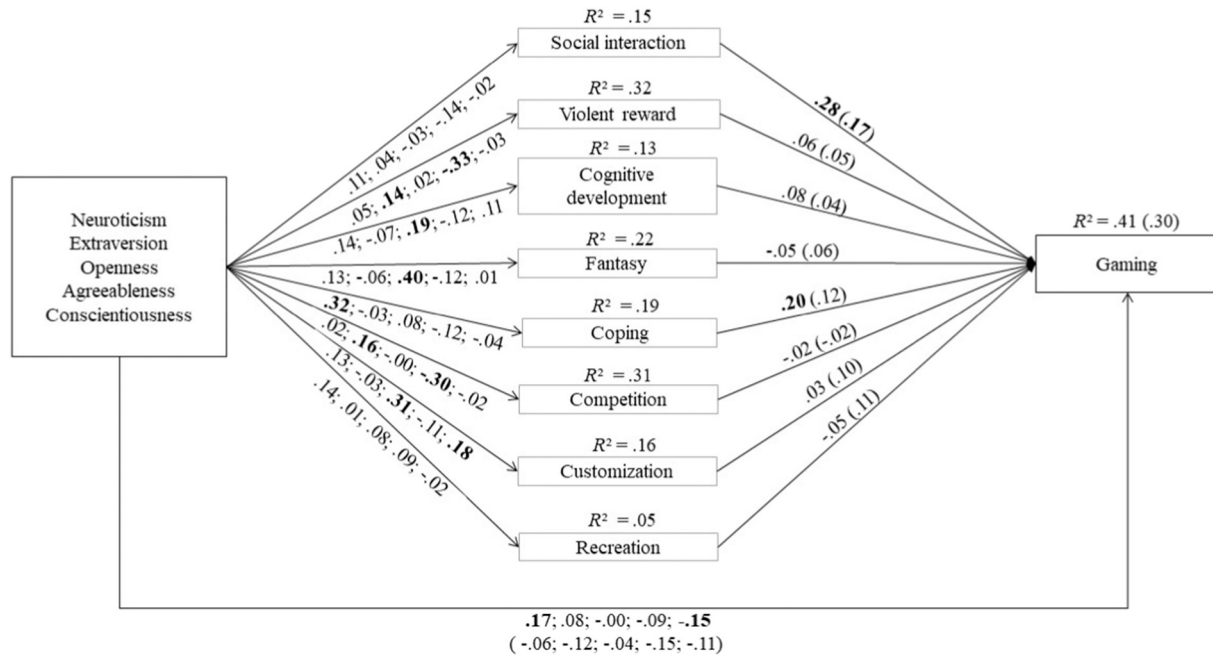


Fig. 1. Final five model (for each personality dimension) of the path coefficients between variables for disordered gaming (values outside of the parentheses) and weekly gaming (values inside of the parentheses) as dependent variables. Gender and age were included as control variables. The first values (left) describe the model path coefficient in which Neuroticism is the independent variable, whereas second, third, fourth and fifth values represent path coefficients of models in which Extraversion, Openness to experience, Agreeableness and Conscientiousness are independent variables respectively. For clarity, covariances between personality traits to each other and videogaming motives to each other are not depicted in the figure. Significant associations are in bold typeface for emphasis and were determined by 99% bias-corrected standardized bootstrapped confidence intervals (based on 10,000 bootstrapped samples) that did not contain zero.

gaming outcomes through motives, see the Supplementary Material).

We also examined the possible moderator effect of sex. As the baseline multigroup model was fully saturated (i.e., fit indexes were not obtained) and it was not possible to compare the adjustment of the constrained model by sex with the baseline model, we performed two regressions on weekly gaming and disordered gaming using sex, age, personality, motives and the interactions between sex and the other independent variables as predictors. Only a significant interaction effect was found between sex and recreation motives in disordered gaming ($\beta = 0.108$; $t = 2.058$; $p = .04$), but when the Bonferroni correction was applied, this interaction became nonsignificant. Therefore, there did not appear to be sex differences in the different paths of the model, so we decided to include age and sex as control variables in the fully saturated model.

4. Discussion

The present study explored the direct and indirect effects of the FFM personality dimensions on weekly and disordered gaming through gaming motives. This research presents three main strengths that are worth highlighting. First, it attempted to comprehensively explore the role of FFM personality domains in the most relevant reasons for playing video games. Second, and as far as we know, it studies for the first time the mediational role of motives between basic personality dimensions and gaming behavior. And finally, it focused on adolescence, a crucial stage in the development of regular and disordered gaming, but in which FFM-related studies are very scarce. To this end, the basic personality dimensions, under the most accepted framework of personality nowadays (the FFM; John et al., 2008) were assessed in adolescents. Our research also employed the VMQ, an instrument developed to comprehensively assess the most frequent motives found in the videogaming literature (López-Fernández et al., 2020b).

Some relevant relationships were found between personality and motives. Thus, and in accordance with our hypothesis, neuroticism was strongly associated with coping, replicating previous findings (de Hessel et al., 2021). On the other hand, in present study neuroticism was not related to fantasy. In some questionnaires, immersion/fantasy motives include escape components (Yee, 2006), which may explain why a few studies have displayed associations between neuroticism and fantasy motivations (e.g., Graham & Gosling, 2013). The fantasy motives in the VMQ employed in present study, however, are composed of immersion and fiction elements exclusively. This fact may explain why this motive presents a strong association with openness, in line with previous findings (Graham & Gosling, 2013; Jeng & Teng, 2008). In addition, and as hypothesized, openness also presented relationships with cognitive development and customization. This last motive presented a significant association with conscientiousness too, an unprecedented finding. With regard to extraversion, it has been previously associated with achievement motives, which may, in part, resemble competition and violent reward constructs (Graham & Gosling, 2013; Park et al., 2011). However, our research did not find associations between social motives and extraversion, in line with some studies (de Hessel et al., 2021; Park et al., 2011) but not others (Graham & Gosling, 2013). Perhaps different scales of social motives may reflect different social processes, and it is likely that the social interaction scale of the VMQ may reflect socialization reasons more than sociability motives. Last, agreeableness was negatively linked to violent reward and competition as hypothesized, in line with the preference of individuals low on agreeableness for violent and competitive games (Chory & Goodboy, 2011; López-Fernández et al., 2020a).

With regard to personality direct and indirect effects on regular and disordered use, low conscientiousness was directly associated with disordered gaming but no indirect effects via motives were found. Therefore, as in the case of disordered gambling (McGrath et al., 2018), conscientiousness might influence disordered gaming independently from gaming motives. Thus, players with lower conscientiousness would

suffer a higher interfering effect of video gaming among life domains due to their difficulty in self-control (Gervasi et al., 2017; Mihara & Higuchi, 2017). Neuroticism was directly and via coping motive related to disordered gaming. In this sense, this finding would reflect a negative affect regulation pathway in problematic videogaming, replicating results found in other addictive behaviors such as alcohol use (Mezquita et al., 2018; Sher et al., 2005). On the other hand, low agreeableness was related to problematic gaming via social interaction motives, and displayed total significant effects in weekly and disordered use. Thus, those less agreeable adolescents may play videogames to be socially integrated which, in turn, would lead to a higher use and abuse of videogames. Similar to our findings, another study found a small but significant mediating effect between general distress and problematic gaming through social motives (Király et al., 2015), although this mediational effect has not always been replicated (Ballabio et al., 2017; Montag et al., 2019). Our finding could likely resemble the deviance proneness pathway described in substance use and abuse (Sher et al., 2005), in which higher video gaming and disordered gaming may be seen as an element of a broader deviant pattern. Therefore, future studies interested in testing the existence of this deviance path in videogaming should include other mediating variables between personality and gaming behavior, such as antisocial behavior or deviant peers, which have presented a relevant mediational role in addictive behaviors such as alcohol consumption (Gallego et al., 2018; Mezquita et al., 2018).

5. Limitations and conclusions

The present study is not without limitations. First, the participants were a convenience sample of teenagers and future studies may check the replication of the present findings among other population groups and larger samples. Second, all the data were self-reported measures subject to well-known biases such as social desirability and recall bias. Third, the cross-sectional nature of the study prevents making causal inferences and therefore future studies may use longitudinal designs to overcome this. Fourth, this study has been conducted in Spanish adolescents, and although Spain shows similar rates of gaming compared to other western countries (Müller et al., 2015), cross-cultural studies should be performed to explore the generalization of present results to other cultures.

In conclusion, the current study has found associations of basic personality traits with regular and disordered gaming partially due to gaming motives in adolescence. Thus, some etiological pathways found in drug use and abuse were also observed in video gaming behaviors: a negative affect regulation in which high neuroticism led to cope motives that partially explained disordered gaming; and a possible deviance proneness pathway in which adolescents low on agreeableness presented higher social interaction motives predicting higher disordered gaming (Sher et al., 2005). These results highlight the relevant role of personality and gaming motives in the prevention and treatment of disordered gaming. For example, personalized treatments according to personality traits and motivations would lead to more efficient interventions (e.g., using targeted-personality interventions) (Conrod et al., 2013); or help in searching replacement behaviors to use in therapy to satisfy psychological needs covered by these videogaming motivations (Steadman, 2019).

Ethics

The study was approved by the ethical committee from the Universitat Jaume I, and authorized by the school board of the participating high schools as well as by the Valencian regional education authorities, and has been carried out in accordance with the Declaration of Helsinki.

CRediT authorship contribution statement

Francisco J. López-Fernández: Conceptualization, Methodology,

Investigation, Data curation, Formal analysis, Writing – original draft. **Laura Mezquita:** Methodology, Formal analysis, Writing – review & editing. **Generós Ortet:** Resources, Funding acquisition, Project administration, Writing – review & editing. **Manuel I. Ibáñez:** Conceptualization, Methodology, Supervision, Funding acquisition, Project administration, Writing – review & editing.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2021.111063>.

References

- Ballabio, M., Griffiths, M. D., Urbán, R., Quartiroli, A., Demetrovics, Z., & Király, O. (2017). Do gaming motives mediate between psychiatric symptoms and problematic gaming? An empirical survey study. *Addiction Research & Theory*, *25*, 397–408. <https://doi.org/10.1080/16066359.2017.1305360>.
- Billieux, J., van der Linden, M., Achab, S., Khazaal, Y., Paraskevopoulos, L., Zullino, D., & Thorens, G. (2013). Why do you play World of Warcraft? An in-depth exploration of self-reported motivations to play online and in-game behaviours in the virtual world of Azeroth. *Computers in Human Behavior*, *29*, 103–109. <https://doi.org/10.1016/j.chb.2012.07.021>.
- Chen, A., & Roberts, N. (2019). Connecting personality traits to social networking site addiction: The mediating role of motives. *Information Technology & People*, *33*, 633–656. <https://doi.org/10.1108/itp-01-2019-0025>.
- Chory, R. M., & Goodboy, A. K. (2011). Is basic personality related to violent and non-violent video game play and preferences? *Cyberpsychology, Behavior and Social Networking*, *14*, 191–198. <https://doi.org/10.1089/cyber.2010.0076>.
- Conrod, P. J., O'Leary-Barrett, M., Newton, N., Topper, L., Castellanos-Ryan, N., Mackie, C., & Girard, A. (2013). Effectiveness of a selective, personality-targeted prevention program for adolescent alcohol use and misuse: A cluster randomized controlled trial. *JAMA Psychiatry*, *70*, 334–342. <https://doi.org/10.1001/jamapsychiatry.2013.651>.
- Cooper, M. L., Kuntsche, E., Levitt, A., Barber, L. L., & Wolf, S. (2016). Motivational models of substance use: A review of theory and research on motives for using alcohol, marijuana, and tobacco. In K. J. Sher (Ed.), *Oxford library of psychology. The Oxford handbook of substance use and substance use disorders* (pp. 375–421). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199381678.013.017>.
- de Hessel, L. C., Rozgonjuk, D., Sindermann, C., Pontes, H. M., & Montag, C. (2021). The associations between Big Five personality traits, gaming motives, and self-reported time spent gaming. *Personality and Individual Differences*, *171*, Article 110483. <https://doi.org/10.1016/j.paid.2020.110483>.
- Dreier, M., Wölfling, K., & Müller, K. (2013). Psychological research and a sociological perspective on problematic and addictive computer game use in adolescence. *International Journal of Child and Adolescent Health*, *6*, 422–435.
- Fam, J. Y. (2018). Prevalence of internet gaming disorder in adolescents: A meta-analysis across three decades. *Scandinavian Journal of Psychology*, *59*, 524–531. <https://doi.org/10.1111/sjop.12459>.
- Gallego, S., Mezquita, L., Moya-Higueras, J., Ortet, G., & Ibáñez, M. I. (2018). Contribution of the five factors of personality and peers on adolescent alcohol use: A cross-national study. *The Spanish Journal of Psychology*, *21*, Article e58. <https://doi.org/10.1017/sjp.2018.63>.
- García-Oliva, C., & Piqueras, J. A. (2016). Experiential avoidance and technological addictions in adolescents. *Journal of Behavioral Addictions*, *5*, 293–303. <https://doi.org/10.1556/2006.5.2016.041>.
- Gentile, D. (2009). Pathological video-game use among youth ages 8 to 18: A national study. *Psychological Science*, *20*, 594–602. <https://doi.org/10.1111/j.1467-9280.2009.02340.x>.
- Gervasi, A. M., La Marca, L., Costanzo, A., Pace, U., Guglielmucci, F., & Schimminelli, A. (2017). Personality and internet gaming disorder: A systematic review of recent literature. *Current Addiction Reports*, *4*, 293–307. <https://doi.org/10.1007/s40429-017-0159-6>.
- Graham, L. T., & Gosling, S. D. (2013). Personality profiles associated with different motivations for playing world of warcraft. *Cyberpsychology, Behavior and Social Networking*, *16*, 189–193. <https://doi.org/10.1089/cyber.2012.0090>.
- Griffiths, M. D., Kuss, D. J., Lopez-Fernandez, O., & Pontes, H. M. (2017). Problematic gaming exists and is an example of disordered gaming: Commentary on: Scholars' open debate paper on the World Health Organization ICD-11 gaming disorder proposal (Aarseth et al.). *Journal of Behavioral Addictions*, *6*, 296–301. <https://doi.org/10.1556/2006.6.2017.037>.
- Jeng, S. P., & Teng, C. I. (2008). Personality and motivations for playing online games. *Social Behavior and Personality*, *38*, 1053–1060. <https://doi.org/10.2224/sbp.2008.36.8.1053>.
- John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative big five trait taxonomy. *Handbook of personality: Theory and Research*, *3*, 114–158.
- Kalivas, P. W., & Volkow, N. D. (2005). The neural basis of addiction: A pathology of motivation and choice. *American Journal of Psychiatry*, *162*, 1403–1413. <https://doi.org/10.1176/appi.ajp.162.8.1403>.
- Király, O., Urbán, R., Griffiths, M. D., Ágoston, C., Nagygyörgy, K., Kókonyei, G., & Demetrovics, Z. (2015). The mediating effect of gaming motivation between psychiatric symptoms and problematic online gaming: An online survey. *Journal of Medical Internet Research*, *17*, Article e88. <https://doi.org/10.2196/jmir.3515>.
- Kircaburun, K., Demetrovics, Z., Griffiths, M. D., Király, O., Kun, B., & Tosuntaş, Ş. B. (2020). Trait emotional intelligence and internet gaming disorder among gamers: The mediating role of online gaming motives and moderating role of age groups. *International Journal of Mental Health and Addiction*, *18*, 1446–1457. <https://doi.org/10.1007/s11469-019-00179-x>.
- 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>.
- Laconi, S., Pirès, S., & Chabrol, H. (2017). Internet gaming disorder, motives, game genres and psychopathology. *Computers in Human Behavior*, *75*, 652–659. <https://doi.org/10.1016/j.chb.2017.06.012>.
- Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2011). Psychosocial causes and consequences of pathological gaming. *Computers in Human Behavior*, *27*, 144–152. <https://doi.org/10.1016/j.chb.2010.07.015>.
- López-Fernández, F. J., Mezquita, L., Griffiths, M. D., Ortet, F., & Ibáñez, M. I. (2020a). The role of personality on disordered gaming and game genre preferences in adolescence: Gender differences and person-environment transactions. In *Adicciones*. <https://doi.org/10.20882/adicciones.0.0>. Advance publication online.
- López-Fernández, F. J., Mezquita, L., Griffiths, M. D., Ortet, G., & Ibáñez, M. I. (2020b). The development and validation of the Videogaming Motives Questionnaire (VMQ). *PLoS One*, *15*, Article e0240726. <https://doi.org/10.1371/journal.pone.0240726>.
- Männikkö, N., Billieux, J., Nordström, T., Koivisto, K., & Käriäinen, M. (2017). Problematic gaming behaviour in Finnish adolescents and young adults: Relation to game genres, gaming motives and self-awareness of problematic use. *International Journal of Mental Health and Addiction*, *15*, 324–338. <https://doi.org/10.1007/s11469-016-9726-7>.
- McCrae, R. R., & Costa, P. T. (2008). Empirical and theoretical status of the five-factor model of personality traits. In G. J. Boyle, G. Matthews, & D. H. Sakloke (Eds.), *Vol. 1. Personality theory and assessment. Personality theories and models* (pp. 273–294). Sage. <https://doi.org/10.4135/9781849200462.n13>.
- McGrath, D. S., Neilson, T., Lee, K., Rash, C. L., & Rad, M. (2018). Associations between the HEXACO model of personality and gambling involvement, motivations to gamble, and gambling severity in young adult gamblers. *Journal of Behavioral Addictions*, *7*, 392–400. <https://doi.org/10.1556/2006.7.2018.29>.
- Mezquita, L., Bravo, A. J., Ortet, G., Pilatti, A., Pearson, M. R., & Ibáñez, M. I. (2018). Cross-cultural examination of different personality pathways to alcohol use and misuse in emerging adulthood. *Drug and Alcohol Dependence*, *192*, 193–200. <https://doi.org/10.1016/j.drugalcdep.2018.08.004>.
- Mihara, S., & Higuchi, S. (2017). Cross-sectional and longitudinal epidemiological studies of internet gaming disorder: A systematic review of the literature. *Psychiatry and Clinical Neurosciences*, *71*, 425–444. <https://doi.org/10.1111/pcn.12532>.
- Montag, C., Schivinski, B., Sariyska, R., Kanner, C., Demetrovics, Z., & Pontes, H. M. (2019). Psychopathological Symptoms and Gaming Motives in Disordered Gaming—A Psychometric Comparison between the WHO and APA Diagnostic Frameworks. *Journal of Clinical Medicine*, *8*, 1691–1708. <https://doi.org/10.3390/jcm8101691>.
- Moya-Higueras, J., Cuevas, A., Marques-Feixa, L., Mezquita, L., Mayoral, M., Fañanas, L., ... Ibáñez, M. I. (2020). Recent stressful life events (SLE) and adolescent mental health: Initial validation of the LEIA, a new checklist for SLE assessment according to their severity, interpersonal, and dependent nature. *Assessment*, *27*, 1777–1795. <https://doi.org/10.1177/1073191118817648>.
- Müller, K. W., Janikian, M., Dreier, M., Wölfling, K., Beutel, M. E., Tzavara, C., ... Tsitsika, A. (2015). Regular gaming behavior and internet gaming disorder in European adolescents: Results from a cross-national representative survey of prevalence, predictors, and psychopathological correlates. *European Child & Adolescent Psychiatry*, *24*, 565–574. <https://doi.org/10.1007/s00787-014-0611-2>.
- Muthen, L. K., & Muthen, B. O. (1998–2015). *Mplus User's Guide* (7th ed.). Muthen & Muthen.
- Ortet-Walker, J., Mezquita, L., Vidal-Arenas, V., Ortet, G., & Ibáñez, M. I. (2020). Validation of an abridged, 60-item form, of the junior Spanish NEO inventory (JS NEO-A60). *Current Psychology*. <https://doi.org/10.1007/s12144-020-01135-y>.
- Park, J., Song, Y., & Teng, C. I. (2011). Exploring the links between personality traits and motivations to play online games. *Cyberpsychology, Behavior, and Social Networks*, *14*, 747–751. <https://doi.org/10.1089/cyber.2010.0502>.
- Sher, K. J., Grekin, E. R., & Williams, N. A. (2005). The development of alcohol use disorders. *Annual Review of Clinical Psychology*, *1*, 493–523. <https://doi.org/10.1146/annurev.clinpsy.1.102803.144107>.

- Sherry, J. L., Lucas, K., Greenberg, B. S., & Lachlan, K. (2006). Video game uses and gratifications as predictors of use and game preference. In P. Vorderer, & J. Bryant (Eds.), *Playing video games: Motives, responses, and consequences* (pp. 213–224). Lawrence Erlbaum.
- Soto, C. J. (2019). How replicable are links between personality traits and consequential life outcomes? The life outcomes of personality replication project. *Psychological Science*, 30, 711–727. <https://doi.org/10.1177/0956797619831612>. Return. to ref 2019 in article.
- Steadman, J. L. (2019). Gaming motivations as a guide to treating problematic gaming behaviors. *Journal of Technology in Behavioral Science*, 4, 332–339. <https://doi.org/10.1007/2Fs41347-019-00103-z>.
- Vollmer, C., Randler, C., Horzum, M. B., & Ayas, T. (2014). Computer game addiction in adolescents and its relationship to chronotype and personality. *SAGE Open*, 4. <https://doi.org/10.1177/2158244013518054>.
- Yee, N. (2006). Motivations for play in online games. *CyberPsychology and Behavior*, 9, 772–775. <https://doi.org/10.1089/cpb.2006.9.772>.