



HAL
open science

Tilt in video gaming: Development and Validation of the Video Gaming Tilt Scale (VGTS)

Emeline Chauchard, Marie Dupau, Yasser Khazaal, Axelle Moreau

► To cite this version:

Emeline Chauchard, Marie Dupau, Yasser Khazaal, Axelle Moreau. Tilt in video gaming: Development and Validation of the Video Gaming Tilt Scale (VGTS). 2023. hal-04405866v2

HAL Id: hal-04405866

<https://hal.science/hal-04405866v2>

Preprint submitted on 5 Mar 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Tilt in video gaming: Development and Validation of the Video Gaming Tilt Scale (VGTS)

Emeline Chauchard^{1*}, Marie Dupau¹, Yasser Khazaal², Axelle Moreau³

¹ Nantes Université, Univ Angers⁽⁴⁾, Laboratoire de psychologie des Pays de la Loire, LPPL, UR 4638, F-44000 Nantes, France

² Addiction Medicine, Lausanne University Hospital and Lausanne University, Lausanne, Switzerland

³ Institut Universitaire sur les Dépendances, 950 Rue de Louvain Est, Montréal, QC H2M 2E8, Canada

**Current affiliation* : UMR 7295 Centre de Recherches sur la Cognition et l'Apprentissage, CNRS, Université de Tours, Université de Poitiers

Role of Funding Sources:

No funding sources

Conflict of interest:

Emeline Chauchard, Marie Dupau, Yasser Khazaal, Axelle Moreau, declare no conflict of interest.

Ethical Statement:

This study followed the ethical guidelines set out in the Declaration of Helsinki and was approved by the local ethics committee (approval number: 07122022)

Acknowledgements: Thank you to Hubert Baillot who worked on building the questionnaire and testing the first version of the VGTS.

Words count: 3282 words

Abstract

Tilt refers to a decrease in playing abilities, due to sudden manifestations of negative emotions (anger or frustration) and engagement in more aggressive behaviour. Tilt is commonly experienced by gamers. The purpose of this article is to assess the psychometric properties of the Video Gaming Tilt Scale (VGTS).

A sample of 454 players (81.7% men) completed a set of questionnaires comprising the VGTS and questionnaires assessing internet gaming disorder, anger, impulsivity, anxiety, and depression. The total sample was randomly divided into two distinct samples of a similar size, Group A and Group B, to conduct exploratory and confirmatory factor analyses.

The exploratory factor analysis identified two factors of equal weight and fitted the data from Group A well. The confirmatory factor analysis reported an excellent fit with the data for Group B. Internal reliability was good and the correlation between the two factors was moderate.

The first factor, "Emotion dysregulation", describes the emotional dysregulation of tilt, particularly anger. The second factor, "cognitive dysregulation", measures cognitive dysregulation and its impact on decision-making and strategy judgement. This scale can contribute to a new area of research focusing on the role of emotion regulation in the trajectories of gamers and problem gamers.

Key Words. Online video game, Tilt, Rage, Anger, Scale validation, Emotion

1. Introduction

In the field of video gaming, the terms “tilt” and “rage” have been adopted by gamers. Both describe a state of frustration and anger, unmanaged by the gamer, which leads to a loss of control and a decrease in the abilities needed to perform in the game (Moreau et al., 2023; Przybylski et al., 2014; Wu et al., 2021). In this article, we will use the term tilt, which is the most widely used in the few studies focused on this construct. Tilt affects players on emotional, cognitive, and behavioural levels (Moreau et al., 2023). Tilt-related phenomena are discussed online by many gamers, on various websites (e.g. Reddit, forums). It is an integral part of the gaming experience. For instance, one outcome could be “*rage quitting*”, where a gamer suddenly quits the game to manage a high-intensity, negative emotional state (Przybylski et al., 2014).

Three qualitative studies on tilt while gaming – focusing on different samples: children (Kahila, Juho et al., 2021), adolescents engaged in e-sport (Wu et al., 2021) and young adult online gamers (Moreau et al., 2023) – have been published recently. All three studies gave similar descriptions of tilt. The triggers of tilt included interactions with other players, whether team members, friends, or strangers; disappointment with one’s own game performance; comparisons with other players; repeated failure and loss; and technical problems (hardware, game or Internet). Participants also reported that the more competitive the game, the more likely they were to tilt (Kahila, Juho et al., 2021; Moreau et al., 2023; Wu et al., 2021), and described tilt as a transitory emotional reaction (Moreau et al., 2023). The main emotional states associated with tilt were anger and frustration, followed by feelings of annoyance, irritation, and guilt (Moreau et al., 2023; Wu et al., 2021). On a cognitive level, study participants described confusion, a decline in ability to

concentrate, impulsive decision-making, and dissociative experiences (Moreau et al., 2023; Wu et al., 2021). When asked about behavioural responses, they reported a loss of control, physical (on hardware) and verbal aggression, and a difference in their usual game play (Kahila, Juho et al., 2021; Moreau et al., 2023; Wu et al., 2021).

Participants reported using various regulation strategies to control their tilt episodes. Some said they would quit the game, namely “*rage quitting*”, to cut off the source of tilt. Then, they would express their emotions by crying or screaming. They might also attempt to change their emotional state by trying to calm down or changing activity; and by rationalizing their anger (Kahila, Juho et al., 2021; Moreau et al., 2023; Wu et al., 2021). The possible consequences of tilt included losing the game, broken equipment, loss of pleasure and interest in the game, and a spill over effect on other gamers. Few participants reported a feeling of emotional release (Moreau et al., 2023).

While most gamers experience some degree of tilt when gaming, some may experience problematic or repeated episodes. Tilt and its consequences should therefore be studied to better understand their possible role in gaming disorder and the negative effects of gaming (anger, sleep disturbance, emotional distress, problems with family and friends -etc.).

Moreover, the regulation of tilt could be a specific focus of prevention programmes that reinforce emotional and cognitive regulation. First however, to better understand tilt and its implications, we developed the Video Gaming Tilt Scale (VGTS) based on the results of the qualitative study (Kahila, Juho et al., 2021; Moreau et al., 2023). This article assesses the psychometric properties of the Video Gaming Tilt Scale (VGTS).

2. Methodology

2.1. Participants

To be included in the study, participants had to be 18 years old, fluent in French, and have played video games at least once in the last month. In total, 1054 people accessed the online questionnaire. Six hundred biased or incomplete questionnaires were excluded from our sample, which accounted for 57% of the recorded answers. The final sample consisted of 454 players, of whom 18.3% (n = 83) were women. The total sample was randomly divided into two distinct samples of similar size, named Group A and Group B. Sociodemographic and gaming characteristics are reported in Table 1. The two groups were statistically similar in these characteristics.

2.2. Materials

The online survey included several questions on sociodemographic data, namely, age, gender and level of education, as well as gaming-related information such as gaming frequency, length of gaming sessions and types of gaming activity. Additionally, participants were invited to answer the following questionnaires:

2.2.1. *The Video Gaming Tilt Scale (VGTS)*

VGTS was developed based on a qualitative study describing tilt among gamers (Moreau et al., 2023), previous studies, and a questionnaire on online poker tilt (Moreau et al., 2015, 2017, 2020). In the qualitative study (Moreau et al., 2023), we identified nine main topics to characterise tilt: anger, impaired reasoning skills, verbal aggression, tension/restlessness, impulsivity, loss of game/decrease in level of play, loss of pleasure/interest, relationship with gaming partners/contagious aspects of tilt, and tilt quit. First, we created three items for each topic – 27 items in total. This first version was trialled with a sample of 25 gamers. In view of comments from participants in this sample, we modified some wording and identified the “rage quit” aspect as an outcome of tilt rather than a component of the

phenomenon. We decided to exclude it from the VGTS but recommend adding a subsidiary question about rage-quit frequency. The 24 items in the VGTS questionnaire are presented in Table 2. The instructions for the questionnaire were: "Please indicate how often you have encountered the following situation in the past three months – 'When I play online video games, there are times when...'. Participants answered the questionnaire on a Likert scale with five different responses: "Never" (0), "Rarely" (1), "Sometimes" (2), "Often" (3), "Almost Always" (4).

2.2.2. *Severity of Tilting Scale*

Two items from the Palomäki, Laakasuo, & Salmela study on tilt in poker (Palomäki et al., 2014) were adapted to video gaming to measure the perceived frequency of tilting episodes. The question "According to you, how many times have you raged in the past 3 months?" was rated on a 7-point Likert scale ranging from 0 to more than 10 times and "Rage has been a problem for me in the last 3 months" was rated on a seven-point Likert scale ranging from "Completely Disagree" (1) to "Completely Agree" (7).

2.2.3. *Online Poker Tilt Scale (OPTS-9)*

The nine-item questionnaire initially used to measure the frequency of tilt episodes in online poker (Moreau et al., 2020) was adapted to the context of gaming. The instruction was "When I play video games online, there are times when...". Responses were reported on a 5-point Likert scale from 1 to 5 ("Never", "Rarely", "Sometimes", "Often", "Almost Always"). Scores range from 0 to 36 and the higher the score, the more frequent the episodes of tilt. OPTS-9 had good reliability in our sample ($\omega = 0.832$)

2.2.4. *Internet Gaming Disorder Test (IGDT-10)*

IGDT-10 (Király et al., 2015) was used to evaluate Internet Gaming Disorder (IGD) using the 9 criteria in DSM-5 (American Psychiatric Association, 2013). Participants answered 10

questions on a three-point Likert scale (“Never”, “Sometimes”, and “Often”). “Often” was scored as “Yes” (1) and “Never” and “Sometimes” were scored as “No” (0). Items 9 and 10 refer to the same criterion and are combined in the scoring. The composite score of IGDT-10 ranges from 0 to 9. A score of more than 5 indicates a potential internet gaming disorder. IGDT-10 had low reliability in our sample ($\omega = 0.658$).

2.2.5. Clinical Anger Scale (CAS)

The CAS is a measure of anger (Snell et al., 1995). This scale is made up of 21 items that assess anger levels in a variety of situations to determine how the individual manages anger. Each item is composed of four statements and participants must choose the one that best corresponds to their feelings or situation. Each statement is associated with a score from 0 to 3. Total scores range from 0 to 63. The CAS had good reliability in our sample ($\omega = 0.891$).

2.2.6. UPPS Impulsive Behaviour Scale

The 20 items in the UPPS Impulsive Behaviour Scale-short form (Billieux et al., 2012) assessed five aspects of impulsivity: urgency, positive urgency, lack of premeditation, lack of perseverance, and sensation seeking. Participants answered on a Likert scale ranging from 1 “I strongly agree” to 4 “I strongly disagree”. Overall scores range from 20 to 80. A high score on a sub-scale and on the overall score corresponds to a high level of impulsivity. In our sample, the UPPS had good reliability ($\omega = 0.821$).

2.2.7. Hospital Anxiety and Depression Scale (HADS)

The Hospital Anxiety and Depression Scale (HADS) is used to evaluate depressive and anxiety symptoms (Roberge et al., 2013; Zigmond & Snaith, 1983). The HADS comprises 14 items divided into two aspects – anxiety and depression. For each item, there are four response options coded from 0 to 3. The score for the two subscales varies between 0 and

21. The higher the scores, the more severe the symptomatology. HADS presented good reliability in our sample ($\omega_{\text{depression}} = 0.688$; $\omega_{\text{anxiety}} = 0.768$).

2.3. Procedure

The questionnaire was created using LimeSurvey software and was available online from March 2019 to September 2019. Participants accessed the questionnaire via an announcement posted on social media gaming groups (primarily Facebook and Twitter). At the beginning of the questionnaire, all participants agreed to give their informed consent and participation was anonymous. This study followed the ethical guidelines set out in the Declaration of Helsinki and was approved by the ethics committee CERNI of Nantes Université (approval number: 07122022)

2.4. Statistical Analysis

First, the sample has been split in two random groups: Group A and group B. Each group corresponds to the half of the sample (Lorenzo-Seva, 2022). To begin, an exploratory factor analysis was performed on the 24 items in the VGTS questionnaire using an oblique rotation and taking half of the study population (Group A). As a first step, the scale, which was based on eight topics from a qualitative study, was reduced to two items per topic by deleting the item with the lowest saturation. Then, a second exploratory factor analysis was performed on these 16 items in the VGTS to identify the structure of the questionnaire. Kaiser criterion (factors with Eigen values greater than 1) and a scree-plot examination (keep all factors before the breaking point or elbow) were used to select factors. Items were assigned to a factor if they weighted greater than 0.45 on that factor (Tabachnick & Fidell, 2012). Finally, a confirmatory factor analysis was performed on the other half of the population (Group B).

Several adjustment indices were used to evaluate the model fully (Tabachnick & Fidell, 2012; Thompson, 2000):

(1) the model chi square divided by degree of freedom (χ^2 / df . With a large sample size, this value should be lower than 2.00. The lower this value, the better the fit), (2) the Tucker–Lewis index (TLI. This value should be 0.90 or higher for a good fit; the higher this value, the better the fit) (Bentler & Bonett, 1980; Tucker & Lewis, 1973), (3) the Comparative Fit Index (CFI. This value should be 0.90 or higher for a good fit; the higher this value, the better the fit) (Bentler, 1990), (4) the Root Mean Square Residual (RMR. This value should be 0.05 or lower; the lower this value, the better the fit), and (5) the Root Mean Square Error of Approximation (RMSEA. This value should be 0.08 or lower; the lower this value, the better the fit) (Steiger, 1980).

The internal consistency of the subdimensions was determined by the ω McDonald.

To test for convergent validity, Pearson's correlations were conducted to examine relationships between scores on the VGTS and other variables (Sample A and B). The statistics were generated using Jamovi software.

3. Results

3.1. Descriptive statistics

The overall population consisted of 454 participants, of whom 369 were men (81.3%) and the mean age was 25.7 years ($SD = 8.5$ years). Table 1 presents the sociodemographic and gaming characteristics of the overall population and for Groups A and B. When it came to gaming behaviour, 5% ($n = 23$) were potential problem gamers.

3.2. Item Suppression

To reduce the scale, we conducted an exploratory factor analysis (EFA) using the Group A sample and including the 24 items used to create the VGTS. The EFA proposed a two-factor solution (KMO = .897; Bartlett test, $p > .001$). This model explained 44.5 % of the variance. The factor matrix and the items associated with each theme are presented in Table 2. At this first step, and for each of the eight topics, we deleted the item that had the lowest saturation. All items from the topic “loss of pleasure” were excluded because they weighted below 0.45. Finally, we selected 14 items for exploratory analyses.

3.3. Exploratory analyses for VGTS

Still considering the sample for Group A, a second EFA was performed using the 14 items selected in the item suppression step. Four more items had to be deleted. Item 1 was deleted because its meaning and saturation were similar to those for item 9 and its removal improved the fit of the scale (RMSEA = 0.0802). Items 2 and 20 were rejected due to their low saturation ($< .45$). As a result, the “relationship with partners/contagious aspects” topic is no longer represented in this scale and like rage-quit, this aspect should be considered a consequence rather than a feature of tilt episodes. Finally, item 15 was deleted, because it loaded similarly on both factors.

A third EFA was performed with the 10 remaining items (Table 3). This explained 55.8% of the variance, which is more than the 50% recommended for a meaningful factor solution. The Bartlett test was significant ($p < .001$) (Floyd & Widaman, 1995), and KMO= .873. The correlated model fitted the data well ($\chi^2 / df = 1.4$, TLI = 0.979, RMSEA = 0.045). The factor matrix for the 10 items in the VGTS is shown in Table 3. The analysis produced a two-factor solution: the first factor, combining items oriented toward cognitive regulation, named “cognitive dysregulation”; and the second, considering items oriented toward emotional

regulation, named “emotion dysregulation”. These factors presented an equivalent percentage of explained variance, respectively, 28.0 and 27.8%.

3.4. Confirmatory factor analysis for VGTS on Group B

The two-factor model derived from the EFA was tested on the second half of the sample, Group B, with a confirmatory factor analysis. The correlated model fitted the data well ($\chi^2 / df = 2$, TLI = 0.946, CFI = 0.959, RMR = 0.043, RMSEA = 0.067). All loadings were significant and the correlation between the two factors was moderate (from 0.35).

3.5. Reliability

The ω McDonald coefficient for reliability was 0.819 for emotional dysregulation and 0.818 for cognitive dysregulation on group B, indicating good internal reliability.

3.6. Correlation

The two factors moderately correlated ($r = 0.351$). The factors cognitive dysregulation (CD) and emotional dysregulation (ED) correlated with the number of episodes ($r_{CD} = 0.227$; $r_{ED} = 0.603$); estimation of tilt as a problem ($r_{CD} = 0.310$; $r_{ED} = 0.534$); the scores for Internet Gaming Disorder ($r_{CD} = 0.171$; $r_{ED} = 0.287$); the Clinical Anger Scale ($r_{CD} = 0.152$; $r_{ED} = 0.349$); Positive urgency ($r_{CD} = 0.163$; $r_{ED} = 0.201$); Negative urgency ($r_{CD} = 0.280$; $r_{ED} = 0.283$); Lack of perseverance ($r_{CD} = 0.200$; $r_{ED} = 0.128$); Lack of premeditation ($r_{CD} = 0.172$; $r_{ED} = 0.128$); Anxiety ($r_{CD} = 0.129$; $r_{ED} = 0.205$); and Depression ($r_{CD} = 0.107$; $r_{ED} = 0.211$).

4. Discussion

The aim of this study was to create and explore the psychometric properties of the VGTS. First, the exploratory factor analysis identified two factors of equal weight and fitted the data from the Group A sample well. Then, the confirmatory factor analysis reported an excellent fit to the data for the Group B sample. The final version of the scale included 10 items divided into two distinct factors. The first factor measures cognitive dysregulation and its incidence on decision-making and strategy judgement. The second factor refers to the emotional dysregulation of tilt, particularly anger. These two factors are concordant with the two aspects assessed by the Online Poker Tilt Scale (OPTS) (Moreau et al., 2020) and are in line with the results of qualitative studies published about tilt (Kahila, Juho et al., 2021; Moreau et al., 2023; Wu et al., 2021). The VGTS measures the occurrence of typical characteristics of tilt, without directly naming the tilt. The higher the score on the scale, the more frequent the episodes of tilt. No cut-off score was defined.

Components from three topics identified by the qualitative study (Moreau et al., 2023) were excluded, namely, “rage quit”, “relationship with partners” / “contagious aspects”, and “loss of pleasure” (Table 2). These three aspects are outcomes or consequences of tilt episodes, and do not characterise it. However, we suggest the use of additional questions to the VGTS to assess the outcomes of tilt on the behaviour of gamers (rage quit), their relations with gaming partners and on their own pleasure and interests in gaming (Supplementary material).

Low to medium correlations indicate that tilt is an independent construct of video game addiction, anger, and impulsivity. Nevertheless, these variables are related, therefore, they deserve to be investigated in future research.

Tilt is a distinct and emerging construct. The VGTS is a new scale in the field of video gaming, which can be used to measure transitory loss of control and subjective experiences of

unpleasant emotions while gaming. This scale can contribute to new areas of research that focus on the trajectories of gamers and problem gamers and which aim to understand emotional regulation and the emotional skills deployed while playing video games and e-sport. It could have clinical and preventative implications. The correlations found with Internet Gaming Disorder may indicate a possible contribution of such aspects to gaming disorder. Further longitudinal studies are called for. The frequency of tilt episodes could help to detect problem players and could be central to prevention by encouraging gamers to develop emotional skills and regulation. Emotional skills are identified as crucial for preventing addictive behaviours and could be used and well received by video game players (Marchica et al., 2019).

This study has several limits. As we used online data collection, our sample could not be considered representative of the video gaming population. Indeed, the sample is mainly composed of men, while women constitute 48% of the online video gaming population (Entertainment Software Association., n.d.). Finally, the psychometric properties of the scale were evaluated using a sample of French or French speaking gamers. Validation of the scale needs to be replicated among various samples of gamers, in different languages.

5. Conclusions

Tilt is well known and identified by gamers but has been understudied in the research field. Tilt refers to a decrease in playing abilities, due to sudden manifestations of negative emotions (anger or frustration) and engagement in more aggressive behaviour. It is triggered by interactions with other players, disappointment with one's own game performance, repeated failure and loss, or technical issues (Kahila, Juho et al., 2021; Moreau et al., 2023; Wu et al., 2021). The VGTS is designed to assess tilt episodes. After performing exploratory

and confirmatory analysis, the scale comprises ten items, divided into two factors: emotion dysregulation and cognitive dysregulation. The scale has good psychometric properties. The VGTS will be useful for developing studies in the field of problematic gaming and e-sport.

REFERENCES

- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders: Dsm-5*. American Psychiatric Publishing.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*(2), 238–246.
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, *88*(3), 588–606. <https://doi.org/10.1037/0033-2909.88.3.588>
- Billieux, J., Rochat, L., Ceschi, G., Carré, A., Offerlin-Meyer, I., Defeldre, A. C., Khazaal, Y., Besche-Richard, C., & Van Der Linden, M. (2012). Validation of a short French version of the UPPS-P Impulsive Behavior Scale. *Comprehensive Psychiatry*, *53*(5), 609–615. <https://doi.org/10.1016/j.comppsy.2011.09.001>
- Entertainment Software Association. (n.d.). The video game player community. 2022 *Essential Fact about Video Games*. Retrieved January 25, 2023, from <https://www.theesa.com/resource/2022-essential-facts-about-the-video-game-industry/>
- Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment*, *7*(3), 286–299. <https://doi.org/10.1037/1040-3590.7.3.286>
- Kahila, Juho, Piispa-Hakala, Satu, Kahila, Sanni, Valtonen, Teemu, Vartiainen, Henriikka, & Tedre, Matti. (2021). “If the game does not work, it is lagging, or you die in game, you just get furious” – Children’s experiences on gamer rage. 21–29. <http://ceur-ws.org/Vol-2883/paper3.pdf>
- Király, O., Slecza, P., Pontes, H. M., Urbán, R., Griffiths, M. D., & Demetrovics, Z. (2015). Validation of the Ten-Item Internet Gaming Disorder Test (IGDT-10) and evaluation of the

nine DSM-5 Internet Gaming Disorder criteria. *Addictive Behaviors*.

<https://doi.org/10.1016/j.addbeh.2015.11.005>

Lorenzo-Seva, U. (2022). SOLOMON: A method for splitting a sample into equivalent subsamples in factor analysis. *Behavior Research Methods*, 54(6), 2665–2677.

<https://doi.org/10.3758/s13428-021-01750-y>

Marchica, L. A., Mills, D. J., Derevensky, J. L., & Montreuil, T. C. (2019). The Role of Emotion Regulation in Video Gaming and Gambling Disorder: A Systematic Review. *The Canadian Journal of Addiction*, 10(4), 19–29. <https://doi.org/10.1097/CXA.0000000000000070>

Moreau, A., Bethencourt, A., Payet, V., Turina, M., Moulinard, J., Chabrol, H., & Chauchard, E. (2023). Rage in video gaming, characteristics of loss of control among gamers: A qualitative study. *Psychology of Popular Media*, No Pagination Specified-No Pagination Specified. <https://doi.org/10.1037/ppm0000481>

Moreau, A., Chauchard, E., Hamel, A., Penthier, L., Giroux, I., & Sévigny, S. (2020). Tilt in online poker: Development of a short version of the online poker tilt scale. *Journal of Gambling Issues*, 44, 45–60.

Moreau, A., Delieuvin, J., Chabrol, H., & Chauchard, E. (2017). Online Poker Tilt Scale (OPTS): Creation and validation of a tilt assessment in a French population. *International Gambling Studies*, 17(2). <https://doi.org/10.1080/14459795.2017.1321680>

Moreau, A., Delieuvin, J., Chauchard, E., & Chabrol, H. (2015). Le TILT au Poker en ligne: Un comportement pathologique transitoire? *Alcoologie et Addictiologie*, 37(3), 245–252.

Palomäki, J., Laakasuo, M., & Salmela, M. (2014). Losing More by Losing It: Poker Experience, Sensitivity to Losses and Tilting Severity. *Journal of Gambling Studies*, 30(1), 187–200. <https://doi.org/10.1007/s10899-012-9339-4>

Przybylski, A. K., Rigby, C. S., Deci, E. L., & Ryan, R. M. (2014). Competence-impeding

electronic games and players' aggressive feelings, thoughts, and behaviors. *Journal of Personality and Social Psychology*, 106(3), 441–457. <https://doi.org/10.1037/a0034820>

Roberge, P., Doré, I., Menear, M., Chartrand, É., Ciampi, A., Duhoux, A., & Fournier, L. (2013). A psychometric evaluation of the French Canadian version of the Hospital Anxiety and Depression Scale in a large primary care population. *Journal of Affective Disorders*, 147(1–3), 171–179. <https://doi.org/10.1016/j.jad.2012.10.029>

Snell, W. E., Gum, S., Shuck, R. L., Mosley, J. A., & Kite, T. L. (1995). The clinical anger scale: Preliminary reliability and validity. *Journal of Clinical Psychology*, 51(2), 215–226. [https://doi.org/10.1002/1097-4679\(199503\)51:2<215::AID-JCLP2270510211>3.0.CO;2-Z](https://doi.org/10.1002/1097-4679(199503)51:2<215::AID-JCLP2270510211>3.0.CO;2-Z)

Steiger, J. H. (1980). Tests for comparing elements of a correlation matrix. *Psychological Bulletin*, 87(2), 245–251.

Tabachnick, B. G., & Fidell, L. S. (2012). *Using Multivariate Statistics*. Pearson.

Thompson, B. (2000). Ten commandments of structural equation modeling. In *Reading and understanding MORE multivariate statistics*. (pp. 261–283). American Psychological Association.

Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, 38(1), 1–10. <https://doi.org/10.1007/BF02291170>

Wu, M., Lee, J. S., & Steinkuehler, C. (2021). Understanding Tilt in Esports: A Study on Young League of Legends Players. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, 1–9. <https://doi.org/10.1145/3411764.3445143>

Zigmond, A. S., & Snaith, R. P. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica*, 67(6), 361–370. <https://doi.org/10.1111/j.1600-0447.1983.tb09716.x>

Table 1. Descriptive statistics for the samples

	All Sample N= 454	Group A n= 227	Group B n= 227
Age	25.7	25.3 (ET = 8.2)	26.1 (ET = 8.7)
Women	83	40 (17.6%)	43 (18.9%)
Men	369	185	184
Socio-professional category			
Student	199 (44%)	103 (45%)	96 (42.3%)
Employee	190 (42%)	100 (44 %)	90 (39.6%)
Unemployed	59 (13%)	21 (9%)	38 (16.7%)
Other	6 (1.6%)	3 (1.3%)	3 (1.3%)
Gaming frequency			
More than once a day	213 (47%)	105 (46%)	108 (47.6%)
Once a Day	145 (32%)	71 (31%)	74 (32.5%)
Two or three times a week	77 (17%)	41 (18%)	36 (16%)
Once a week	14 (3%)	8 (3.5%)	6 (2.6%)
Twice a month or less	5 (1%)	2 (1%)	3 (1.3%)
Length of playing sessions			
Less than 30 minutes	16 (3.5%)	8 (3.5%)	8 (3.5%)
Between 30 min and 1 h	26 (6%)	14 (6.2%)	12 (5.3%)
Between 1 and 2 h	115 (25%)	57 (25%)	58 (25.6%)
Between 2 and 3 h	146 (32%)	78 (34%)	68 (30%)
Between 3 and 4 h	67 (15%)	31 (13%)	36 (15.9%)
More than 4h	84 (18%)	39 (17%)	45 (19.8%)
Multiplayers practice	325 (71%)	158 (69%)	167 (73.6%)
Type of game played (not exclusive)			
Massively Multiplayer Online (MMO)	252 (55%)		
Multiplayer Online Battle Arena (MOBA)	170 (37%)		
Role Playing Game	250 (55%)		
Strategy/Management	232 (51%)		
Survival	166 (36%)		

Table 2. Themes associated to each item in the VGTS and factor matrix for the first exploratory analysis after oblic rotation (Sample A)

Themes	Items from the original version	Factor 1	Factor 2
Anger	1. I am angry [Je suis en colère] 5. Others make me angry [Les autres me mettent en colère] 9. I feel anger [Je ressens de la colère]	.808 .656 .802	
Alteration in reasoning abilities	3. My decisions are no longer rational [Mes décisions ne sont plus rationnelles] 26. I play poorly [Je joue mal] 16. I make bad choices [Je fais de mauvais choix]		.496 .723 .806
Verbal Aggression	19. I insult others [J'insulte les autres] 18. I criticise the game out loud [Je critique le jeu à voix haute] 17. I swear [Je dis des gros mots]	.750 .700 .612	
Tension / restlessness	6. I hit my hardware hard (mouse, keyboard, gamepad) [Je tape fort sur mon matériel (souris, clavier, manette)] 7. I am physically tense [Je suis tendu physiquement] 14. I feel irritated [Je me sens énervé]	.540 .668 .832	
Impulsivity	15. I play without thinking about the consequences [Je joue sans penser aux conséquences] 27. I act without thinking [J'agis sans réfléchir] 10. I take more risks [Je prends plus de risque]	.497 .730 <.45	
Loss of the game/decrease in level of play	12. I no longer apply the strategy necessary to succeed [Je n'applique plus la stratégie nécessaire pour réussir] 8. I am below my usual level [Je suis en dessous de mon niveau habituel] 11. I am not efficient [Je ne suis pas efficace]		.745 .663 .794
Loss of pleasure, lack of interest	23. I felt like I was wasting my time [J'ai eu l'impression de perdre mon temps] 21. I thought the game was poorly done [J'ai trouvé que le jeu était mal fait] 13. I don't enjoy the game anymore [Je n'ai plus de plaisir à jouer]	<.45 <.45 <.45	<.45 <.45 <.45
Contagious aspects/relationships with partners	2. My gaming partners told me to calm down [Mes partenaires de jeu m'ont dit de me calmer] 20. I annoy my teammates [J'énerve mes coéquipiers] 4. My teammates reproach me [Mes coéquipiers me font des reproches]	.537 .563 <.45	

Note:

The numeration of the items corresponds to the order in which they appear in the questionnaire the participants completed.

Items in bold correspond to the selected items included in the second round of the exploratory analysis of the VGTS.

Table 3. Factor matrix for the third exploratory analysis (Group A sample)

VGTS Items	Factor 1 <i>Cognitive dysregulation</i>	Factor 2 <i>Emotion dysregulation</i>
1. I am not efficient [Je ne suis pas efficace]	.769	
2. I make bad choices [Je fais de mauvais choix]	.765	
3. I play poorly [Je joue mal]	.753	
4. I act without thinking [J'agis sans réfléchir]	.744	
5. I no longer apply the strategy necessary to succeed [Je n'applique plus la stratégie nécessaire pour réussir]	.711	
6. I feel irritated [Je me sens énervé]		.845
7. I feel anger [Je ressens de la colère]		.841
8. I insult others [J'insulte les autres]		.690
9. I am physically tense [Je suis tendu physiquement]		.665
10. I criticize the game out loud [Je critique le jeu à voix haute]		.660
ω McDonald	0.865	0.857
Explained Variance	28.0%	27.8%

