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Psychological Evaluation

"Dangerous Games" and Adolescents' Psychological Functioning: A Multimethod Assessment

Rute da Conceição Machado[1]
Lucila Moraes Cardoso[2]

Abstract: "Dangerous games" are a complex social phenomenon which demands in-depth investigation. This study aimed to compare adolescent groups with and without a history of practicing "aggression games" and/or "non-oxygenation games" regarding impulsivity, depressive symptoms, the big five personality traits and emotional dynamics. Thus, a total of 239 adolescents aged 12 to 17 years initially and asynchronously answered five self-report measures. Then, 70 participants from the previous stage answered the Pfister Online in remote synchronous mode at a second moment. Descriptive and inferential statistical analysis were used. Different patterns were found between groups in relation to neuroticism, conscientiousness, impulsive and depressive symptom traits. Regarding emotional dynamics, a tendency to behave in an aggressive way and to be attracted to intense stimuli was observed among "aggression game" participants. Furthermore, "non-oxygenation game" participants showed greater insecurity and search for emotional balance.

Keywords: risk behavior, personality traits, depression, adolescents

"Brincadeiras Perigosas" e Funcionamento Psicológico na Adolescência: Um Estudo de Avaliação Multimétodo

Resumo: As "brincadeiras perigosas" são um fenômeno social complexo que demanda uma investigação aprofundada. Este estudo teve como objetivo comparar grupos de adolescentes com e sem histórico de prática de "jogos de agressão" e/ou "jogos de não oxigenação" quanto à impulsividade, aos sintomas depressivos, aos cinco grandes fatores da personalidade e à dinâmica emocional. Inicialmente, 239 adolescentes de 12 a 17 anos responderam, de modo remoto assíncrono, a cinco medidas de autorrelato. Posteriormente, 70 participantes da etapa anterior responderam, de modo remoto síncrono, ao *Pfister Online*. Empregaram-se análises estatísticas descritivas e inferenciais. Constataram-se padrões diferenciados entre os grupos em relação ao neuroticismo, à conscienciosidade, aos sintomas depressivos e à impulsividade. Quanto à dinâmica emocional, observou-se no grupo de "jogos de agressão" uma tendência a se comportar de maneira agressiva e ser atraído por estímulos intensos. O grupo de "jogos de n**ão** oxigenação" demonstrou maior insegurança e busca de equilíbrio emocional.

Palavras-chave: comportamento de risco, traços de personalidade, depressão, adolescentes

"Juegos Peligrosos" y Funcionamiento Psicológico en la Adolescencia: Una Evaluación Multimétodo

Resumen: Los "juegos peligrosos" son un fenómeno social complejo que exige una investigación en profundidad. Este trabajo tiene como objetivo comparar adolescentes con y sin antecedentes de práctica de "juegos de agresión" y/o "juegos sin oxigenación" en función de la impulsividad, los síntomas depresivos, los cinco grandes factores de personalidad y la dinámica emocional. Inicialmente, 239 adolescentes de 12 a 17 años respondieron a distancia, de forma asincrónica, cinco medidas de autoinforme. Posteriormente, 70 participantes de la etapa anterior respondieron el Pfister Online, modalidad síncrona. Se utilizaron análisis estadísticos descriptivos e inferenciales. Los grupos mostraron patrones diferentes en relación con el neuroticismo, la responsabilidad, los síntomas depresivos y la impulsividad. En cuanto a la dinámica emocional, el grupo de "juegos de agresión" mostró una tendencia a comportarse de manera agresiva ya sentirse atraído por estímulos intensos. El grupo de "juegos sin oxigenación" mostró mayor inseguridad y búsqueda de equilibrio emocional.

Palabras clave: conducta de riesgo, rasgos de personalidad, depresión, adolescentes

[1]*Faculdade Ari de Sá, Fortaleza-CE, Brazil*

[2]*Universidade Estadual do Ceará, Fortaleza-CE, Brazil*

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Correspondence address: Rute da Conceição Machado. Faculdade Ari de Sá. Av. Heráclito Graça, 826, Aldeota, Fortaleza-CE, Brazil. CEP 60.140-060. E-mail: rute_machado@yahoo.com

"Aggression games" (AGs) and "non-oxygenation games" (NOGs) are part of the social phenomenon of "dangerous games", which are potentially lethal behaviors of self- and/or hetero-aggression most often carried out by groups of children and adolescents for entertainment and socialization purposes (Michel, 2015; Romano, 2009). "Dangerous games" cover a broad behavioral spectrum, but the principle of these practices is always the same, namely that of using gratuitous violence and attributing recreational aspects to aggressive behaviors, which can be directed at oneself or others (Romano, 2009).

AGs include physically violent behaviors directed by an individual or a group against a target, whose participation may occur consensually or forcedly (Michel, 2015). In consensual practices, all participants agree with the aggressions and there is generally a reversibility of roles between aggressors and victims. On the other hand, this reversibility does not occur in forced practices, and only the aggressors see the practice as a "game". These behaviors are not fights between peers, since they are intentional and there is no apparent motivation (Romano, 2009).

The behaviors regarding NOGs include apnea, strangulation, and/or compression of the chest or neck, which may be emitted individually or collectively, with the purpose of experiencing a brief state of euphoria and hallucinations resulting from the reduction of blood flow and oxygenation of the brain. These practices can induce fainting in some cases, leaving the practitioner in a temporary state of unconsciousness (Austin et al., 2021; Michel, 2015).

A total of 49 serious accidents and/or deaths resulting from the practice of "dangerous games" involving children and adolescents between the ages of 7 and 17 were reported in Brazil between 2014 and 2022. This data was collected by the Instituto DimiCuida, a non-profit organization dedicated to preventing "dangerous games" (Deslandes & Coutinho, 2022; Vasconcelos & Eisenstein, 2022). However, no empirical research publications regarding the prevalence of these behaviors in the Brazilian context were found in scientific journals. Evidence was found in the international literature that children and adolescents with a history of participating in "dangerous games" were more likely to engage in other risk behaviors and to have psychopathological symptoms (Austin et al., 2021; Michel et al., 2019). Few authors have focused on investigating the influence of psychological and psychopathological variables on the practice of "dangerous games". Among the studies which have discussed these aspects, we can highlight those by Bernadet et al. (2012), Garcia et al. (2022) and Michel et al. (2019).

A predictive model was found in the study by Bernadet et al. (2012) conducted with French students, in which AG experimentation was impacted by high hyperactive-impulsive symptoms, low future-related stress and high novelty-seeking, which explained 31% of the variance. Maintenance of the practice was explained 6.1% by low cooperation and low harm avoidance. Regarding NOGs, 8.1% of the experimentation was impacted by strong novelty-seeking, hyperactive-impulsive symptoms and the use of active coping strategies. Maintenance of the practice was 28.4% explained by a combination of high hyperactive-impulsive and depressive symptoms.

In line with this, Michel et al. (2019) observed that higher levels of depressive symptoms and conduct disorder significantly explained the practice of NOGs among French students aged between 9 and 16 years. Finally, Garcia et al. (2022) observed significant differences between French students with and without a history of NOG practice in terms of temperament and character profiles assessed using the Junior Temperament and Character Inventory. The group with a history of practice demonstrated greater novelty seeking, less persistence, less reward dependence and less cooperation when compared to the group without a history. Multivariate logistic regression controlling for the gender, age, grade repetition and geographic location (urban/rural) variables showed that only the novelty seeking trait significantly explained engagement in NOGs.

It is worth noting that the resource used by Garcia et al. (2022) and Michel et al. (2019) to measure NOG practice presented considerable limitations, since the assessment was based on a single dichotomous item. Furthermore, the results of these cross-sectional studies are restricted to the French sociocultural context, making it impossible to generalize to other contexts or cultures.

The independent variables in these studies were measured through self-report psychological measures (Bernadet et al., 2012; Garcia et al., 2022; Michel et al., 2019), which are exclusively based on the person's narrative about themselves, meaning on the introspective self-assessment of their behaviors, thoughts, and emotions. It has been common for researchers to work with self-report instruments based on the five-factor model of personality (de la Fuente et al., 2020; Gouveia et al., 2021, Meléndez et al., 2020; Szcześniak et al., 2020). Self-report measures and projective methods are commonly used tools for psychological assessment of personality (Villemor-Amaral & Pasqualini-Casado, 2006).

Villemor-Amaral and Pasian (2022) define projective methods as tasks whose stimuli or instructions are poorly structured, enabling elaboration of a variety of possible responses. Responses are elicited as the person structures the stimuli of these tests which express fundamental aspects of their psychological functioning, attributing idiosyncratic meanings to the stimuli based on their typical way of thinking, feeling, and acting. Projective methods encompass different types of tasks, such as filling in pyramid schemes with colored squares (Villemor-Amaral, 2014; Villemor-Amaral & Pasian, 2022).

According to Villemor-Amaral and Pasqualini-Casado (2006), self-report tests and projective methods access information about the person at different levels, meaning they capture different aspects of the same state, trait, or need. As they depend on the examinee's self-assessment, self-report measures access explicit traits or needs that the person recognizes as characteristics of their routine functioning. On the other hand, projective methods capture implicit needs and spontaneous behaviors which may be known to the examinee or may be hidden, latent, or unconscious (Villemor-Amaral & Pasqualini-Casado, 2006). Self-report and projective measures can be integrated during

data collection, enabling understanding of psychological functioning from different angles. This type of procedure is called multimethod assessment (Mihura, 2012).

The multimethod approach is essential for an appropriate analysis of the different facets that permeate psychological phenomena. It is worth noting that no multimethod assessment studies and/or studies that used projective tests to assess psychological correlates were found in the literature on "dangerous games". Therefore, this study aimed to compare adolescent groups with and without a history of practicing "aggression games" and/or "non-oxygenation games" regarding impulsivity, depressive symptoms, the big five personality traits and emotional dynamics.

Method

This study employed a quantitative, exploratory, ex-post-facto research approach.

Participants

The first stage of the study involved 239 adolescents from Fortaleza, Ceará, Brazil, aged between 12 and 17 years (M = 14.64; SD = 1.69). Of these, 54% declared themselves to be female, 55% attended private schools, 4.6% were repeating, and 53% were in high school. This was a convenience, non-probabilistic sample. The inclusion criteria were that participants were between 12 and 17 years old and literate, since the research instruments required reading skills. Students under 12 years old or over 17 years and 11 months old were excluded from the study.

Next, 70 of the initial 239 adolescents participated in the second stage and were divided into two groups. The first group consisted of 35 adolescents who admitted to having practiced AGs and/or NOGs, aged between 12 and 17 years (M = 14.4; SD = 1.81), 51% of whom were female, 60% attended private schools, 6% had failed a year, and 46% were in high school. The second group, also with 35 participants, reported never having engaged in these practices. They were aged between 12 and 17 years (M = 14.77; SD = 1.78), 60% of whom were female, 43% attended private schools, 6% had failed a year, and 60% were in high school. Both groups were discriminated based on the results of the Dangerous Games Questionnaire.

Instruments

Sociodemographic questionnaire. This questionnaire aims to measure sociodemographic aspects of participants, such as age, gender, type of school (public/private), grade level, and history of school failure.

Dangerous Games Questionnaire. This questionnaire aims to assess children and adolescents' engagement in "dangerous games" and is organized into two parts. The first explores the initiation context into AGs, and the second part deals with NOGs. The examinees answered 20 multiple-choice questions that assessed the history of practicing AGs and/or NOGs, the age at entry, the place of practice, participation forms, practice frequency, awareness of the risks associated with these behaviors, among other aspects (Guilheri et al., 2015).

Big Five Inventory (BFI-20). This instrument aims to assess personality based on the Big Five factor model. The response scale is a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The reduced model of 20 items and 4 factors presented acceptable psychometric indicators, explaining 37.2% of the total variance, with factor loadings between 0.31 and 0.80. Cronbach's alpha and McDonald's omega coefficients were respectively 0.72 and 0.73 in the extraversion dimension, 0.69 and 0.64 in agreeableness, 0.56 and 0.55 in conscientiousness, 0.69 and 0.72 in neuroticism and 0.60 and 0.61 in openness (Gouveia et al., 2021).

Barratt Impulsiveness Scale for Adolescents (BIS-12). This scale aims to measure impulsive behaviors. The response scale is a four-point Likert scale, ranging from 1 (never/rarely) to 4 (almost always/always). The reduced 12-item model showed adequate fit indices (CFI = 0.95; TLI = 0.93; RMSEA = 0.055), with factor loadings ranging from 0.34 to 0.68. Cronbach's alpha coefficients and the alpha corrected by the Spearman-Brown formula were 0.75 and 0.97, respectively (Willhelm et al., 2020).

Children's Depression Inventory (CDI). This instrument aims to screen depressive symptoms among children and adolescents and is composed of 27 multiple-choice items. There are three alternatives for each item which represent the severity of the symptoms, and the respondent must choose the one that best describes their feelings during the last two weeks. Regarding the psychometric indicators, Coutinho et al. (2008) identified a single-factor solution that explained 36.86% of the total variance, with factor loadings between 0.41 and 0.72 and Cronbach's alpha of 0.91.

Pfister Computerized Application System – Pfister Online. This instrument aims to assess emotional dynamics, constituting the computerized version of the Color Pyramids Test. Pfister Online is administered through online software, which can be accessed via computer, laptop or tablet, as long as it has a minimum resolution of 1024x768, and the following internet browsers are compatible: Safari (version 15 or higher), Google Chrome (version 94 or higher), Microsoft Edge (version 94 or higher) and Mozilla Firefox (version 93 or higher).

The examinee must complete an identification questionnaire when initially accessing the software. The test instructions are then presented, which can be repeated as many times as the examinee deems necessary. In order to perform the test, the examinee must complete pyramid schemes, one at a time, using a set of colored squares available at the bottom of the screen. The colors which compose the test are four shades of blue, green and red, three shades of violet, two shades of yellow, orange and brown and the colors black, white and gray (Villemor-Amaral, 2012).

The Pfister test provides information about how the person is stimulated by the emotional charge of situations

and how they express their emotions. This is interpreted from the dynamic integration of the variables that compose it, such as the frequency of colors, chromatic syndromes and formal aspect (Scortegagna et al., 2023; Villemor-Amaral, 2014). The frequency of colors indicates the consistency with which each color and its shades were used in the test. Chromatic syndromes are groups of three or more colors that have their own meanings. The formal aspect represents the pyramid's structural configuration, and is classified into three major categories (carpets, structures, and formations) and 14 subcategories based on the complexity of the color arrangement on the pyramidal scheme. This variable is an indicator of the cognitive control of emotions, and the more structured the pyramids, the greater the degree of emotional maturity (Villemor-Amaral, 2014).

This software is currently not available for professional use by psychologists and can only be used in the context of research. The initial studies to standardize and provide evidence of the validity of Pfister Online have been developed since 2021 by a group of researchers from different regions of Brazil.

Procedures

Data collection. Data were collected between November 2021 and May 2022 in two remote stages. The first stage was conducted in an asynchronous remote format, in which the participants completed an online form that could be accessed via computer, laptop, tablet or smartphone. This form included the Informed Consent Form for parents, the Informed Assent Form and the five self-report measures.

Then in the second stage, participants from the previous stage were invited via email to apply the Pfister Online. A total of 169 of the initial participants did not respond and 70 responded positively to the invitation, of which 35 admitted to having already practiced AGs and/or NOGs, and 35 reported never having engaged in these practices. The Pfister Online was administered to each examinee individually in a single meeting in a synchronous remote format via a Google Meet video call.

We initially sought to establish rapport with the adolescent and clarify any doubts. Then, the software access link was sent via the video call chat and the examinee was asked to share the screen of their device so that the examiner could synchronously monitor the test resolution. Before the application, the examinees were instructed to set the screen brightness of their device to the maximum level and to perform the activity in a quiet environment to avoid interruptions from third parties. The test application lasted an average of 20 minutes. Once the data collection was completed, the obtained information was then statistically analyzed and interpreted.

Data analysis. The collected data were analyzed using IBM SPSS Statistics software, version 23.0. First, central tendency, dispersion and frequency measures were run to characterize the sample. Next, one-way analyses of variance (One-Way ANOVA) were performed to assess whether there were differences between the groups of adolescents regarding depressive symptoms (total CDI score), impulsivity (total BIS-12 score), and the big five personality traits (BFI-20 dimensions). Then, the adolescents were grouped into four categories, namely, history of practicing only AGs (n = 31), history of practicing only NOGs (n = 27), history of practicing AGs and NOGs (n = 23) and non-practitioners of AGs and NOGs (n = 158).

Data normality was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests, while variance homogeneity was analyzed using the Levene test. Bootstrapping procedures (1000 re-samplings; 95%CI BCa) were used to obtain greater reliability of the results, correct deviations from normality of the sample distribution and differences between group sizes, and present a 95% confidence interval for differences between means (Haukoos & Lewis, 2005).

Considering the heterogeneity of variance, Welch's correction and post hoc evaluation using the Games-Howell technique were requested. The effect size was calculated using omega squared (ω^2) and Cohen's d. ω^2 ranges from 0 to 1, with values between 0.01 and 0.05 considered small, between 0.06 and 0.13 medium, and above 0.14 large. For the interpretation of Cohen's d, values between 0.20 and 0.49 are considered small, between 0.50 and 0.79 moderate, between 0.80 and 1.29 large, and above 1.30 very large (Kumar et al., 2022).

The coding accuracy of the formal aspect of the Pfister Online was verified in the subsequent stage. To this end, a second examiner coded 28% (n = 20) of the total test protocols (n = 70). The coding results were evaluated by calculating Cohen's Kappa, with coefficients above 0.60 being acceptable (McHugh, 2012).

Considering that the Kolmogorov-Smirnov, Shapiro-Wilk and Levene tests showed deviations from normality and heterogeneity of variance, the non-parametric Kruskal-Wallis statistic was used to evaluate the statistical differences between the groups in the distribution of the color frequency, chromatic syndromes and formal aspect of the Pfister Online variables, which are indicators of emotional dynamics.

The effect size of the differences was calculated using the ordinal Epsilon-squared (E^2), with values between 0.01 and 0.08 considered small, between 0.08 and 0.26 medium, and above 0.26 large. The effect size for paired comparisons was estimated using Pearson's r. For interpretation, values less than or equal to 0.10 are considered null or negligible, between 0.11 and 0.29 small, between 0.30 and 0.49 medium, and above 0.50 large (Kumar et al., 2022).

Ethical Considerations

The research protocol was approved by the Human Research Ethics Committee of the Universidade Federal do Ceará, with opinion No. 5,068,647 - CAAE No. 52261521.5.0000.5054, in accordance with all ethical guidelines established in Resolution No. 510/2016 of the National Health Council and in Circular Letter No. 2/2021/CONEP/SECNS/MS. Special attention was given to the potential need to listen to and support the participants, as they are adolescents reflecting on the sensitive topic of "dangerous games".

Results

One-way analyses of variance were performed to assess whether adolescents with and without a history of practicing AGs and/or NOGs differed with regard to impulsivity, depressive symptoms, and the five personality factors. Since the Kolmogorov-Smirnov and Shapiro-Wilk tests indicated deviations from normality in the data distribution ($p < 0.05$) and there was heterogeneity of variance between the groups in the indicators of depression (Levene (3, 235) = 3.65, $p = 0.013$), extraversion (Levene (3, 235) = 4.00, $p = 0.008$), agreeableness (Levene (3, 235) = 13.09, $p < 0.001$) and conscientiousness (Levene (3, 235) = 4.86, $p = 0.006$), it was decided to use bootstrapping procedures (1000 resamplings; 95%CI BCa) and Welch correction (Table 1).

Table 1

Comparison between groups based on self-report psychological measures

			Confidence interval for mean (95% CI *Bca*)					
		M (*SD*)	Standard error	Lower limit	Upper limit	*F*	*P-value*	ω^2
Impulsivity (BIS)	AGs	26.29 (4.43)	0.79	24.86	27.73	7.41	< 0.001	0.074
	NOGs	26.41 (4.59)	0.85	24.79	27.95			
	AGs/NOGs	26.78 (5.27)	1.07	24.88	28.95			
	NP	23.22 (5.20)	0.41	22.43	24.00			
Depression (CDI)	AGs	34.71 (7.29)	1.32	32.27	37.66	7.19	< 0.001	0.072
	NOGs	36.67 (5.71)	1.05	34.84	38.59			
	AGs/NOGs	37.35 (4.61)	0.96	35.46	39.23			
	NP	33.28 (4.55)	0.36	32.55	34.03			
Conscientiousness	AGs	10.94 (3.16)	0.59	9.84	12.09	3.76	0.038	0.033
	NOGs	12.70 (2.88)	0.56	11.55	13.82			
	AGs/NOGs	12.00 (4.34)	0.88	10.35	13.60			
	NP	13.14 (4.26)	0.34	12.44	13.80			
Neuroticism	AGs	10.13 (4.78)	0.86	8.61	11.66	11.95	< 0.001	0.120
	NOGs	12.81 (4.58)	0.90	11.12	14.53			
	AGs/NOGs	11.43 (3.71)	0.77	9.76	13.06			
	NP	8.34 (3.92)	0.32	7.73	8.96			

Note. AGs = Aggression games; NOGs = Non-oxygenation games; NP = Non-practitioners.

As shown in Table 1, the analysis of variance found that the adolescents differed significantly in terms of impulsivity, depressive symptoms, neuroticism, and conscientiousness levels. The differences between groups regarding the effect size for conscientiousness were small in magnitude ($\omega^2 = 0.033$), while a medium effect size was observed in the other variables ($\omega^2 > 0.006$).

The post hoc test identified that the group that admitted to never having practiced an AG or NOG throughout their lives demonstrated less impulsivity compared to those who practiced only AGs ($\Delta M = -3.06$, 95% CI *Bca* [-4.87, -1.15], $d = 0.61$), only NOGs ($\Delta M = -3.18$, 95% CI *Bca* [-5.08, -1.20], $d = 0.63$), and those who engaged in both "games" ($\Delta M = -3.56$, 95% CI *Bca* [-5.84, -1.39], $d = 0.69$). The group that only practiced NOGs ($\Delta M = 3.38$, 95% CI *Bca* [1.09, 5.93], $d = 0.72$) and the one that engaged in both "games" ($\Delta M = 4.06$, 95% CI *Bca* [2.02, 6.06], $d = 0.90$) exhibited higher depressive symptom levels compared to students who never participated in these risk behaviors.

Regarding personality traits, it was observed that adolescents with no history of participation in AGs and/or NOGs demonstrated lower neuroticism compared to those who practiced only NOGs ($\Delta M = -4.47$, 95% CI *Bca* [-6.46, -2.65], $d = 1.12$) and those who experienced AGs and NOGs ($\Delta M = -3.09$, 95% CI *Bca* [-4.80, -1.50], $d = 0.80$). On the other hand, students with a history of only practicing AGs presented lower conscientiousness levels than those without a history of participation in AGs and NOGs ($\Delta M = -2.20$, 95% CI *Bca* [-3.54, -0.86], $d = 0.54$).

Next, the responses of the adolescent groups to the Pfister Online were compared in the second stage. First, the coding accuracy of the formal aspect variable was assessed using the Kappa test, which indicated strong reliability between examiners for pyramid I ($k = 0.93$, $p < 0.001$, agreement = 95%), for pyramid II ($k = 0.87$, $p < 0.001$, agreement = 90%) and for pyramid III ($k = 0.87$, $p < 0.001$, agreement = 90%).

The Kruskal-Wallis test results showed significant differences between the groups in the frequency of the color red (Red), frequency of red shades 2 (Red2) and 3 (Red3; $H(3) = 9.83$, $p = 0.001$, $E^2 = 0.14$), blue shades 1 (Blue1; $H(3) = 7.82$, $p = 0.050$, $E^2 = 0.11$) and 2 (Blue2), and brown shade 1 (Brown1; $H(3) = 7.81$, $p = 0.050$, $E^2 = 0.11$), as well as in the stimulus syndrome and symmetrical formation variables. These differences presented medium effect sizes, according to Table 2.

Table 2

Comparison between groups which only practiced AGs (n = 15), only NOGs (n = 10), AGs and NOGs (n = 10), and non-practitioners of AGs and NOGs (n = 35) in the Pfister Online Indicators

							Paired comparisons		
Variables	Groups	Medium post	*H*	*P-value*	E^2	*Z*	Adjusted *p-value*	*r*	
Red	AGs	47.30	8.250	0.041	0.12	2.75	0.036	0.39	AGs > NP
	NOGs	32.50							
	AGs/NOGs	39.80							
	NP	30.07							
Red2	AGs	47.63	15.637	0.001	0.22	3.49	0.003	0.49	AGs > NP
	NOGs	30.95							
	AGs/NOGs	44.25							
	NP	29.10							
Blue2	AGs	25.57	10.435	0.015	0.15	-3.10	0.011	0.69	AGs/NOGs >AGs
	NOGs	40.30							
	AGs/NOGs	50.45							
	NP	34.11							
Stimulus syndrome	AGs	48.87	8.806	0.032	0.12	2.80	0.030	0.40	AGs > NP
	NOGs	29.75							
	AGs/NOGs	36.00							
	NP	31.27							
Symmetrical formation	AGs	39.13	11.997	0.007	0.17	3.22	0.007	0.48	NOGs > NP
	NOGs	48.60							
	AGs/NOGs	31.65							
	NP	31.30							

Note. AGs = Aggression games; NOGs = Non-oxygenation games; NP = Non-practitioners.

As shown in Table 2, pairwise comparisons with adjusted p-values demonstrated that there were significant differences in the frequency of the color red, the Red2 shade, and the stimulus syndrome between the group that never practiced AGs or NOGs and the group that only practiced AGs. On the other hand, the Blue2 shade frequency differed statistically between adolescents with a participation history only in AGs compared to those who practiced AGs and NOGs.

Although the overall effect with regard to the Red3, Blue1, and Brown1 shades was significant, none of the specific comparisons between the groups showed statistical differences in these variables. Significant differences were observed regarding the formal aspect in the distribution of symmetrical formations between the group which only practiced NOGs and the group that never practiced AGs or NOGs. The effect sizes of these differences ranged from medium to large.

Discussion

The aim of this study was to compare groups of adolescents with and without a history of AGs and/or NOGs in relation to indicators of impulsivity, depressive symptoms, the Big Five personality traits, and emotional dynamics. The results demonstrated different patterns between the groups in terms of psychological functioning assessed by a multi-method approach using self-report and projective measures (Mihura, 2012; Villemor-Amaral & Pasqualini-Casado, 2006).

Using self-report measures, it was observed in stage 1 that regardless of the type of "dangerous game", adolescents with a history of practicing it demonstrated more impulsive functioning than non-practitioners. It was noted in previous studies that both participants in AGs and NOGs presented significantly higher hyperactivity-impulsivity and novelty-seeking levels, which characterizes a tendency to experience new and intense emotions and stimuli, associated with greater exploratory activity and impulsive decision-making (Bernadet et al., 2012; Garcia et al., 2022).

Specificities were found regarding depressive symptoms, personality traits and emotional dynamics among students who reported having practiced only AGs, only NOGs and those who experienced both. The group with a history of practicing only AGs demonstrated lower conscientiousness compared to those who had never practiced a "dangerous game". Conscientiousness is a personality trait associated with a tendency toward organization, responsibility, and

self-discipline, manifested through characteristics such as concentration, impulse control, the ability to wait for delayed rewards, and follow rules (de la Fuente et al., 2020; Szcześniak et al., 2020). This result is in line with the findings of Bernadet et al. (2012), in which the practice of AGs among French students was explained by low future-related stress, high hyperactivity-impulsivity, and novelty seeking.

In line with this, the group that only experienced AGs showed an increase in the frequency of red, Red2 shade and stimulus syndrome in the Pfister Online compared to those without a history of practicing AGs or NOGs. The stimulus syndrome is composed of the Pfister warm color group. According to Villemor-Amaral (2014), the increase in this syndrome reflects a tendency towards egocentrism, affective incontinence and maladjustment when not accompanied by good indicators of emotional control. It is worth noting that red is the most stimulating color in the test and is related to the experience of exciting and intense emotional states. Its increase is generally associated with extroversion, impulsivity, irritability and aggressiveness, especially when there is a predominance of Red2 and the absence of emotional containment mechanisms (Villemor-Amaral, 2014).

The empirical evidence identified from self-report and projective measures suggests that the practice of AGs may be associated with externalizing behaviors. Impulsive functioning and a tendency to behave in a more exciting or aggressive manner and to be attracted to intense stimuli were observed in this group. These indicators were expected, since AGs are based on the use of gratuitous and intentional physical violence through attributing recreational aspects to aggressions (Michel, 2015; Romano, 2009).

On the other hand, the group that practiced only NOGs and those who practiced AGs and NOGs reported higher neuroticism and depressive symptom levels when compared to adolescents who never practiced a “dangerous game”. Neuroticism is the personality domain that indicates the degree of emotional stability of people, revealing how their negative emotions are experienced and expressed. High levels of this trait are associated with anxiety, depression, excessive worry and/or emotional distress. In contrast, people with low neuroticism are resilient and emotionally stable, being able to objectively evaluate negative experiences, controlling their worries, anger and impulses (de la Fuente et al., 2020; Gouveia et al., 2021; Meléndez et al., 2020; Szcześniak et al., 2020).

Regarding the Pfister Online indicators, students who only experienced NOGs demonstrated an increase in symmetrical formations compared to those who did not practice AGs or NOGs. According to Villemor-Amaral (2014), the increase in symmetrical formations indicates greater insecurity and a search for emotional balance. The way in which the examinee structures the color on the pyramid scheme in the Pfister test is an expression of how they manage their emotional resources. The more structured the pyramids are, the greater the degree of emotional maturity. In this sense, symmetrical formations denote an intermediate cognitive and emotional functioning linked to feelings of insecurity, internal instability and fear of losing balance (Villemor-Amaral, 2014).

The indicators observed in the self-report instruments and in the projective method suggest that adolescents who practice NOGs demonstrated greater insecurity, depressed mood and a search for emotional balance linked to a tendency to behave impulsively. Similar results were verified in international studies. Bernadet et al. (2012) and Michel et al. (2019) found that high levels of depressive symptoms had a significant impact on the practice of NOGs among French students.

In this context, in addition to exploring risk and impulsivity, it is believed that some adolescents may have an emotional dependence associated with NOGs, using them as a dysfunctional strategy to deal with negative emotions and stressful situations. The euphoric and hallucinatory sensations resulting from hypoxia may function for these adolescents as an escape mechanism from reality (Austin et al., 2021; Bernadet et al., 2012; Michel, 2015; Michel et al., 2019).

In this sense, it is considered that the practice of NOGs may be associated with internalizing behaviors and present a component of self-directed violence, since this group presented impulsive and emotionally unstable functioning, being vulnerable to the presence of negative affects. The increased neuroticism factor in this group may reflect difficulties in dealing with frustrations, and consequently in the use of dysfunctional coping strategies.

There are some limitations of this study, such as the synchronous remote format of the second stage of data collection restricted the sample representativeness, since the participation of adolescents required the use of a tablet or computer with internet access and a webcam. Although digital inclusion has been growing substantially in the country, it is known that groups with lower purchasing power have limited access to communication and information technologies.

The difficulties experienced by the researchers during the data collection process are highlighted, since accessing the adolescents was an arduous task. The Instagram social network was initially used as the main vehicle for disseminating the study. However, the reach of the target audience was low, making it necessary to seek other means of dissemination. The method that demonstrated the greatest effectiveness was the partnership with clinical and school psychologists, teachers and family members of adolescents who facilitated presenting the study to the target audience.

Although there are limitations, it is believed that this study was of utmost importance from both a social and scientific point of view. Projective methods were not used in previous research to assess the psychological functioning of those who engage in “dangerous games”. The use of similar techniques to the Pfister test reduces the risks of social desirability, since the examinee is unaware of the attributes assessed by the test and its assessment does not depend on introspective analyses (Villemor-Amaral & Pasian, 2022; Villemor-Amaral & Pasqualini-Casado, 2006). Furthermore, it is believed that Pfister Online is an attractive tool for children and adolescents because it is a playful method, as well as because of this population’s greater proximity to digital technologies.

The results observed in this study can support health and education professionals who work in the context of adolescence, providing them with useful information on psychological aspects associated with these risk behaviors. Considering the indicators evaluated in the multi-method approach, it is believed that interventions related to AG practices require promoting self-control skills and regulating aggressive impulses. In addition, it is necessary to invest in coping strategies to deal with negative emotions and anxiety-provoking situations related to NOGs.

The relevance of this study to the scientific literature is emphasized, as empirical data on the specificities of AGs and NOGs were presented, a topic that is scarcely discussed in national publications. Furthermore, we suggest systematizing and evaluating prevention programs for "dangerous games" aimed at children and adolescents in future studies. Finally, we argue that prevention processes should include strategies which aim to develop self-control and emotional self-regulation (among other measures), given the impact of personality traits and emotional dynamics on the practice of these risk behaviors during adolescence.

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Rute da Conceição Machado is a Professor of the Faculdade Ari de Sá, Fortaleza-CE, Brazil.

Lucila Moraes Cardoso is a Professor of the Universidade Estadual do Ceará, Fortaleza-CE, Brazil.

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