

Artigo de Original

Neuropsychological aspects, drug use and traits of psychopathy in homicidal teenagers: a mixed explanatory approach**Aspectos neuropsicológicos, uso de drogas e traços de psicopatia em adolescentes homicidas: abordagem mista explanatória**<http://dx.doi.org/10.18316/sdh.v12i2.10802>

Pedro Vasconcelos Corrêa^{1*} ORCID: 0000-0003-0340-5145, Rosa Maria Martins de Almeida² ORCID: 0000-0002-2450-2238

ABSTRACT

Introduction: The phenomenon of the adolescents in conflict with the law (ACL) affects everyone involved in interpersonal violence. **Objectives:** To understand the neuropsychological aspects of executive functions (EFs), impulsivity, anger, drug use (DU), psychopathy traits (PT), and beliefs about the concept of violence which were assessed in n=15 juvenile homicide offenders. **Method:** A mixed-explanatory approach with multiple cases and instruments was used: Wisconsin Card Sorting Test (WCST), State-Trait Anger Expression Inventory (STAXI), Barratt Impulsivity Scale (BIS-11), Hare Psychopathy Checklist Revised (PCL-R), questionnaire and neuropsychological protocol as well as categorized representations from PCL-R interview notes. **Results:** Quantitative data showed that drug use in the month of the offense occurred in 73.3% of cases. First use began at 13.2 years old (SD=2.8; 7-18) for alcohol and 13.6 years old (SD=2.1; 9-17) for marijuana. Participants exhibited perseveration (M=29.9; SD=13.2), impulsivity (M=76.4; SD=4.8), and anger (M=21.7; SD=8.3) with borderline IQ. These data, which are higher than standardized scores, suggest deficits in EF, increased impulsivity, anger, and PT, with early drug use. **Conclusion:** The results contribute to the understanding of the concept of violence focused more on actions than on reflection on the interpersonal consequences of violence. Thus, we understand the pathways such as early exposure to work and drug use due to school failure and life precarity.

Keywords: executive function; inhibitory control; anger; neuropsychology; homicide; violence.

¹ Doctoral student in the Program in Psychology, Institute of Psychology, Federal University of Rio Grande do Sul (UFRGS), Porto Alegre-RS, Brazil

² Ph.D. and professor at the Graduate Program in Psychology, Institute of Psychology, Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, Brazil

* **Autor correspondente:** Address: R. Capitão Esron de Menezes, Nº 1661, Bairro Areal, 76804292 – Porto Velho, RO-Brazil. Phone: +5569992195672. E-mail: pedrovasconceloscorrea@hotmail.com.

RESUMO

Objetivos: A violência praticada por adolescentes em conflito com a lei (ACL) afeta a todos. Para compreendê-los, avaliaram-se funções executivas (FEs), impulsividade, raiva, uso de drogas (UD), traços de psicopatia (TP) e representações sobre violência. **Método:** Participaram $n = 15$ adolescentes homicidas. Utilizou-se abordagem mista explanatória de casos múltiplos, sendo instrumentos: **Teste Wisconsin** de Classificação de Cartas (WSCT), Inventário de Expressão de Raiva como Estado e Traço (STAXI), Escala de Impulsividade *Barratt* (BIS-11), Escala Hare (PCL-R), questionário e protocolo neuropsicológico; e representações categorizadas a partir de notas da entrevista PCL-R. **Resultados:** 73.3% dos casos relataram uso de drogas no mês do ato; com primeiro uso aos 13,2 anos ($DP=2,8$; 7-18) para álcool e 13,6 anos ($DP = 2,1$; 9-17) para maconha; com resposta perseverativa ($M=29,9$; $DP=13,2$), PCL-R total ($M=22,5$; $DP=5,9$), impulsividade ($M=76,4$; $DP=4,8$), traços de raiva ($M=21,7$; $DP=8,3$) com QI limítrofe; indicando déficits em FE, elevada impulsividade, raiva e TP, com precoce uso de drogas. **Conclusões:** o conceito de violência centrou-se mais na ação do que reflexão das consequências da violência. E, as trajetórias revelaram exposição precoce ao trabalho, uso de drogas com presença de insucesso escolar e precariedade de vida.

Palavras-chaves: função executiva; controle inibitório; raiva; neuropsicologia; homicídio; violência.

INTRODUCTION

One aspect of interpersonal violence is the social problem of young people who die from homicide. In Brazil, in 2019, there were 23,327 homicides in the age group of 15 to 19 years old.¹ This multifaceted topic represents a gap in the understanding of the profile of adolescent perpetrators of homicide based on neurobiology theory.² There are gaps in the Brazilian context, which makes the study of this topic relevant due to the importance of this event for developing essential knowledge to distinguish profiles within the criminology of human development.³ Characterizing the profile of adolescents who have committed violent acts is considered a guiding element of human development assessment and promotion practices, a measure expected in ACL work.⁴⁻⁵

Understanding neuropsychological aspects such as executive functions (EFs), psychopathic traits (PT), and drug use (DU) about the cognitive and emotional development of adolescents in conflict with the law (ACL), thus helping to understand the violence perpetrated by this group. In this scenario, the concept of EFs encompasses executive and cognitive control exercised through the functions of cognitive inhibition and self-control (behavioral inhibition).⁶ In the psychobiological model of self-regulation, EFs with the presence of motivation and emotional context (hot aspect) are distinguished from those in neutral contexts that utilize cognition (cold aspect).⁷ Furthermore, in adolescents, hot and cold EFs are vulnerable to risk factors such as exposure to environmental stimuli that can trigger violent behavior.⁸

The presence of deficits in interference skills and cognitive inhibition in young people with delinquent behavior is a reality.⁹ This scenario is characterized by difficulties in cognitive flexibility and organization, which affect the direction and processing of information when performing new roles,¹⁰⁻¹¹ as well as the recall of verbal working and response switching.¹² Notably, flexibility also moderates the protective influence of peers for adolescents in a situation of early maturation.¹³ Moreover, a self-control deficit is related to recidivism and involvement in delinquent behavior.¹⁴⁻¹⁵ Therefore, the event-related error marker can assess inhibitory function as a measure of impulsivity.¹⁶

Therefore, the measurement of impulsivity levels is inferred to reflect inhibitory control, and impulsivity can be understood in terms of three main factors (motor, attention, and planning) described by the Barratt Scale.¹⁷⁻¹⁸ It is noteworthy that impulsivity is high among sexual aggressors,¹⁹ with greater use of aggression¹⁰ and anger with weak inhibitory control,²⁰ and that they are sensitive to drug use.²¹ It should be noted that the reality of low performance in EFs is evidenced by greater impulsivity in violent offending, both with and without psychopathy,^{12,22} where the deficit in planning may exacerbate offenders' antisocial behavior.²³

In the relationship between EFs and PT, there is evidence for the presence of high traits and the condition of low inhibition.²⁴ Furthermore, impulsive traits are related to changes in connectivity patterns in cognitive control networks, suggesting biological heterogeneity in psychopathy processes.²⁵ Assessing PT using the (PCL-R), biological levels of empathic dissociation were found to be related to factor 1,²⁶ with the highest scores in factor 2 for repeat offenders.²⁷⁻²⁸ Furthermore, high levels of emotional insensitivity are related to an earlier age for the first offense and more significant behavioral disturbances.²⁹⁻³⁰

Correlations between PT and aspects of brain function suggest that gray matter volume is reduced in young people with marked traits, reflected in smaller paralimbic and limbic regions.³¹⁻³² In homicide offenders, reduced gray matter volume in the temporal lobes, hippocampus (amygdala), and insula correlates with stronger interpersonal and affective traits.³³ There is evidence for the existence of multidimensional PT models with amygdalar connectivity patterns, and PT implies different behavioral expressions.³⁴

PT is a reality in crimes with severe violence.³⁰ Moreover, it is associated with dysfunctions in executive control systems and subcortical regions,³⁵ which also exhibit a failure to self-regulate in the environment in the presence of high traits.³⁶ This reality suggests a correlation between PT and higher levels of proactive aggression and externalizing problems,³⁷⁻³⁸ higher levels of anger,³⁹ and lower levels of prosocial emotions.⁴⁰ This situation implies the presence of high reactive aggression and low response inhibition,⁴¹ making anger a predictor of aggressive⁴² behavior, with the state of dysregulation indicative of the presence of hostility.⁴³⁻⁴⁴

The internalizing variables EFs, PT, impulsivity, and anger are influenced by drug use⁴⁵, with multiple and cumulative use being predictors of offending behavior.⁴⁶⁻⁴⁷ Additionally, there is heavy use of marijuana and alcohol in the month before arrest, and the average age of 12 at the start of the process stands out.⁴⁸ ACLs are targets of peer influence (gang and neighborhoods),⁴⁹ and DU is related to the presence of more antisocial behavior and higher levels of PT.⁵⁰⁻⁵¹

Based on the findings about EFs, PT, and DU, the question arises as to what extent these elements are present in ACL homicides. Therefore, this study aimed to evaluate neuropsychological aspects and representations of violence in ACL homicides, with specific objectives: a) assessing EFs, PT, impulsivity, drug use, and anger, and b) categorizing and describing representations of violence. The following questions were posed regarding the representations: How do EFs manifest in ACL homicides? What is evident in the life histories of ACL homicide offenders regarding PT, impulsivity, anger, DU, and concepts about violence? The expected outcomes of this study were the description of EFs, impulsivity, DU, PT, and anger along with the identification of personal representations of the concept of violence.

METHOD

This research used an explanatory sequential Mixed-Method approach for the collection and analysis of quantitative and qualitative data⁵² with a multi-case design⁵³. Data from only phase three of the research are presented (see the design in Table 1).

Table 1. Explanatory Sequential Design: Sample, Instruments, and Analysis

		Goal	Method	Findings
Phase 1	Study 1 Systematic Review	Identify and describe relationships: FEs, DU, PT, impulsiveness, anger with the infraction.	Systematic review: - PRISM. - 44 studies.	Functions with high levels. Empirical gaps: DU prevalence, FE levels, PT, anger; relationships with sexual behavior, an infraction.
	Study 2 Empirical, quantitative cross-sectional	Assess the levels of impulsivity and anger; characterize the DU; check associations.	N=159 (primary and Reincident juvenile offenders). -Drug use questionnaire. -State-Trait Anger Expression Inventory (STAXI). -Barratt Impulsiveness Scale (BIS-11). -Variance Analysis (ANOVA). -Quasi-Poisson regression. -Correlation.	High levels of anger and impulsiveness. DU in primary (higher marijuana use in life). DU in those with reiteration (higher cocaine use).
Phase 2	Study 3 Empirical, quantitative cross-sectional	Evaluate and Identify a relationship between the prediction of the onset of sexual behavior, levels of EF, and PT within fractional reiteration.	N=109 (adolescent offenders with the presence of acts of serious violence). -Hare Psychopathy Checklist Revised (PCL-R). Wisconsin Card Sorting Test (WSCT). Neuropsychological tasks (Stroop, verbal Fluency, track A and B, mesulam and digits). Wechsler Intelligence Scale. -Variance Analysis (ANOVA). Quasi-Poisson regression. Correlation.	Low levels of FEs. High PT and early sexual behavior.
	Study 4 Empirical, Mixed Method Multiple case studies.	Understand neuropsychological aspects and representations of violence.	N=15 (Incarcerated adolescents who commit homicide). All instruments of the quantitative phase. Use of the interview (PCL-R) and questionnaire for qualitative data.	We integrated quantitative and qualitative analysis.

Participants

The sample consisted of N = 15 adolescents in conflict with the law (ACL), all homicide offenders, including three girls and 12 boys, with a mean age of 17.5 years (SD = 1.3; range: 14-19). In terms of educational background, 53.3% were from grades D-E and 33.3% from C1 and C2. Regarding skin color, 46.7% (N = 7) were white, 40% (N = 6) were brown, and 13.3% (N = 2) were black. A history of school failure was reported in 93.3% of cases, with an average school length of 6.5 years. Aspects of the relationship with family indicated that 40% did not have a father figure, 40% of the participants rated their relationship as good or average, and only 6.7% reported having a poor relationship with their father; with their mother, 80% reported having a good relationship. The use of a weapon in the crime was reported by 86.7% of participants, with 66.7% using weapons such as hands, knives, hammers, scalpels, and 33.3% using firearms, with 33.3% having access through friends and 33.3% through their own homes. Forty percent of participants had the intention to commit a crime, 73.3% (N = 11) were first-time offenders, and 26.7% (N = 4) were repeat offenders, with a mean of 2.7 (SD = 1.9) visits to the police. Regarding the frequency of the first offense, the types were characterized by theft (40%) and murder (40%); the mean age for the first offense was 15.3 years (SD = 1.6). Other aspects of the

sample indicated a mean of 436.9 (SD = 318.7) days of deprivation of liberty in socio-educational institutions, with a mean age of 13.2 (SD = 1.7; range: 9-16) for first sexual intercourse and a mean age of 12.7 (SD = 2.6; range: 9-17) for the initiation of work relationships. Regarding the types of homicide: parricide (N = 2), fratricide (N = 1), femicide (N = 1), homicide of an LGBTQ individual (N = 1), collective crime (N = 5), and other contexts (N = 5).

Instruments

Quantitative data

A drug use frequency questionnaire was used (covering frequency, class of substances, and pairs of use, an adapted version.⁵⁴ The socio-demographic classification of the sample, along with data from the history of offenses, was included in this questionnaire.⁵⁵

Impulsiveness was assessed using the Barratt Impulsiveness Scale (BIS-11).⁵⁶ Moreover, the feeling of anger was assessed with the State-Trait Anger Expression Inventory – STAXI.⁵⁷

To assess the traits of psychopathy the Hare Psychopathy Checklist Revised (PCL-R) was employed.⁵⁸ This 20-item structured interview indicated a cutoff score of 23 (CI=21.61 to 24.05), which corresponds to the state of psychopathy in a Brazilian study, with an overall mean of 28.63 (CI=26.78 to 30.48) and a Kappa index of 0.87.⁵⁸

Executive Functions were assessed using a protocol consisting of the Wisconsin Card Sorting Test (WCST) to evaluate abstraction ability to modify cognitive strategies.⁵⁹ Neuropsychological tasks included the following,⁶⁰⁻⁶¹: 1) a measure of the Stroop effect (with 24 stimuli in three shapes: rectangle; words such as: “everyone”, “never”, “today”, and “everything”; and colors: brown, blue, pink, and green); 2) semantic (animals and fruits) and phonological (F.A.S.) verbal fluency task; 3) the Trail Marking Test A and B task; 4) four models of the Mesulam Cancellation task;⁶² and 5) the digit subtest of the Wechsler Intelligence Scale.⁶³⁻⁶⁴

Qualitative data

The Hare Psychopathy Checklist-Revised (PCL-R)⁵⁸ interview was used to elicit information on schooling, employment, family, mental health, criminal history, and self-reporting. In addition, open-ended questions about the presence of aggression and the concept of violence were included in the substance use questionnaire.

Data collection and analysis procedures

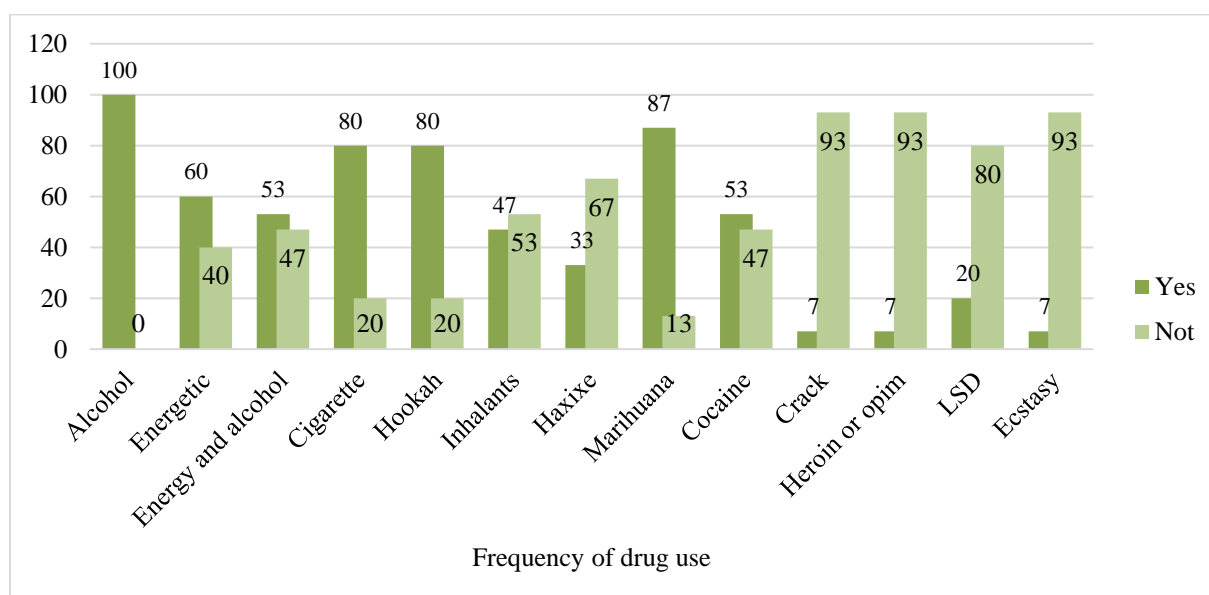
The study included units of the socio-educational network in Porto Velho, RO (two institutions for men and one for women). Data collection took place from March 2021 to October 2022, with access to the field granted after authorization from the competent authorities (executive and judicial). The neuropsychological assessment was conducted in individual psychological care sessions, lasting up to three sessions, initiated with the signing of free and informed consent (TALE) for minors and free and informed consent (TCLE) for adults, family members, or heads of institutions in the absence of family members. Ethical aspects were evaluated by the Research Ethics Committee of the Psychology Institute of the Federal University of Rio Grande do Sul (CAAE: 59004422.1.0000.5334; opinion number: 5.492.733). Participants were selected based on the criterion of committing a criminal act of homicide (see the design in Table 1).

Quantitative analysis was performed using descriptive statistics (mean and standard deviation) using.⁶⁵ Qualitative data were obtained from structured interview notes, which were transcribed, coded, and presented in emerging descriptive categories.⁶⁶⁻⁶⁷ Furthermore, personal history was identified in terms of their presence or absence in the cases.

RESULTS

The frequency of DU indicated that 33.3% (N = 5) used it on the day of the offense; in the months leading up to the offense, 73.3% reported use, and within the previous six months, 60% reported using substances (86.7% marijuana, 53.3% cocaine, 100% alcohol, and 80% cigarettes; see Figure 1). Regarding the place of first alcohol consumption, 46.7% reported that it occurred at a friend's house, with friends being the primary source of consumption for 60%. The mean age for the initiation of alcohol use was 13.2 years (SD = 2.8; range: 7-18), and 13.6 years (SD = 2.1; range: 9-17) for the first use of marijuana.

Figure 1. Relative frequency of Drug Use (DU) throughout life



The description of the Neuropsychological is found in Table 2.

Table 2. Levels of neuropsychological inspects of ACL Murder Authors

	CI 95%				Normative value			
	Mean	Lower	Upper	SD	Lower	Upper	Mean	SD
WCST								
Nº of trials administered	125.8	122.2	129.3	6.4	103	128	118.8	18.0
Perseverative errors	23.3	16.5	30.12	12.3	4	45	22.6	11.8
Complete categories	4.1	3.3	4.9	1.4	2	6	4.0	1.7
Essays to complete the 1 st category	15.6	10.9	20.2	8.3	10	36	20.43	16.67
Failure to maintain context	2.1	1.4	2.7	1.2	0	4	1.2	1.2
Perseverative response	29.9	22.5	37.2	13.2	13	57	25.09	13.82
Conceptual level response	8.3	6.8	9.9	2.8	2	13	-	-
Correct total number	77.7	71.8	83.7	10.7	58	95	70.5	16
Learn to learn	4.7	0.1	9.3	7.6	-12.9	16.8	-5.9	13.9
Non-perseverative errors	22.7	16.6	28.9	11.1	8	51	25.7	15.8

Stroop Effect								
Rectangle time	17.4	15.4	19.5	3.7	12.9	26.1	-	-
Words time	23.8	17.2	30.3	11.8	12.8	61.4	-	-
Colors time	33.6	28.4	38.9	9.5	16.9	48.6	-	-
Digits								
Direct	7.1	5.8	8.4	2.3	4	13	-	-
Reverse	3.2	2.0	4.35	2.0	0	6	-	-
Verbal Fluency								
Phonological	26.6	20.6	32.6	10.8	1	44	-	-
Semantics	27.1	23.4	30.9	28	14	38	-	-
Trails A and B								
Total A	35.1	30.6	39.6	8.1	22.9	52.9	-	-
Total B	88.9	57.6	120.3	56.6	4.4	224.0	-	-
Mesulan								
Randomized letter	121.0	92.4	149.6	49.5	65.9	223.6	-	-
Randomized symbol	103.7	87.53	119.8	28.0	60.2	145.9	-	-
PCL-R								
PCL-R 1	12.2	10.6	13.8	2.9	5	17	9.7	3.0
PCL-R 2	9.2	7.6	10.8	2.9	5	14	7.0	3.1
PCL-R Total	22.5	19.2	25.7	5.9	10	30	18.1	2.7
<i>Barratt Scale</i>								
Total	76.4	73.7	79.1	4.8	70	86	67.8	-
Motor	28.1	26.0	30.15	3.8	23	37	22.3	-
Attention	21.8	19.8	23.8	3.6	13	28	20.1	-
Non-planning	25.8	23.9	27.6	3.3	21	33	25.2	-
Anger								
State of anger	14.3	10.6	18.0	6.7	10	34	10.4	4.4
Trace of anger	21.7	17.10	26.4	8.3	11	36	14.7	6.7
Angry expression	29.3	21.7	37.0	13.8	16	66	16.4	9.7
Angry temper	9.5	6.3	12.7	5.8	4	25	5.4	3.4
IQ								
Verbal IQ	80.9	73.6	88.3	13.2	54	102	-	-
Execution IQ	73.1	64.5	81.6	15.4	52	115	-	-
Total IQ	74.3	66.8	81.7	13.5	54	111	-	-

WSCT standardized data.⁵⁹ PCL-R data for the partial personality disorder group (PD).⁵⁸ Impulsivity scores.⁶⁷
 Normative scores for anger.⁵⁷

The scores indicated more attempts to complete the WCST, which is a significant indicator of failure to maintain context and perseverative. That score differed from normalized scores (M = 89.03 and SD = 20.32; M = 0.56 and SD = 0.84; M = 11.16 and SD = 8.30, respectively).⁵⁹ In traits of psychopathy, compared to standardized scores, participants showed high scores (total trait M = 18.09 and SD = 2.68; factor 1 M = 9.70 and SD = 2.99; factor 2 M = 7.00 and SD = 3.15).⁵⁸ Additionally, there was a high score for impulsivity (M = 67.6),⁶⁷ along with states of anger, traits of anger, expression of anger, an angry temperament (M = 10.4 and SD = 4.4; M = 14.7 and SD = 6.7; M = 16.4 and SD = 9.7; M = 5.4 and SD = 3.4, respectively).⁵⁷

The adolescents' representations of their families' views of the activities performed were characterized by surprise at the act, an elicitation of helping behavior, and concern about having caused someone suffering. Regarding the representation of violence, the concept was formed from four descriptive categories: the act, the object of the act, the product of the act, and the violence as an object of reflection (see Table 3).

Table 3. Representation violence concept

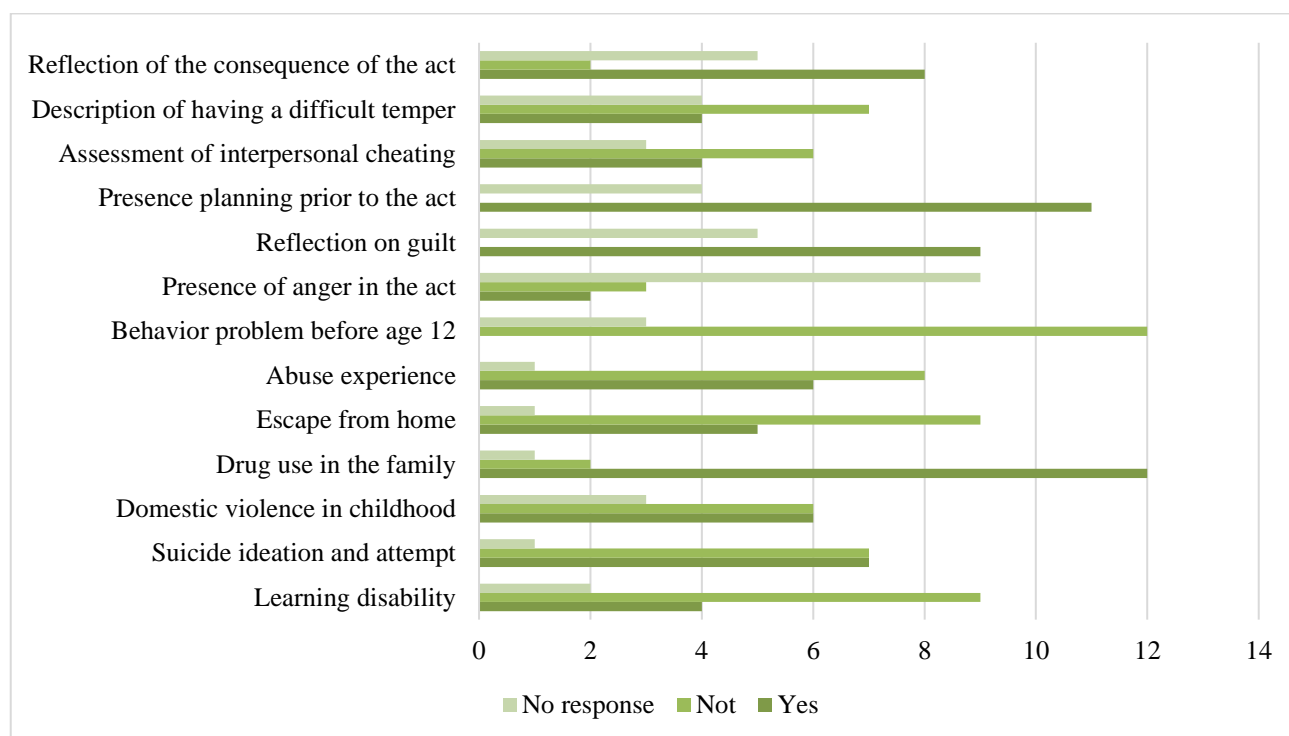
	Representations
Action	- "(...) just having killed (...)". – "being aggressive, wanting to hit, wanting to be angry (...)". - "(...) fighting, cursing". – "Treating people with the treatment they should not." – "(...) verbal or physical aggression against a person". – "Bater, spank." – "Fury." – "Want to scream, speak loudly."
Action object	- "A person being physically attacked (...)". – "Something bad that can harm people."
Action product	- "Faction rivalry, threats."
Reflection object	- "Bullshit." - "It causes suffering, greater inelegant." – "Something bad, inappropriate."

The characterization of the offense revealed that N = 12 participants reported using a firearm. Of these, N = 5 used a firearm (purchased or provided by friends), while N = 7 described the use of blunt weapons (knife, axe, hammer, and iron bar). N = 6 involved domestic use, and N = 1 reported that the weapon was offered by friends. Regarding the purpose of possessing the weapon, N = 7 stated they had previously intended to commit the crime themselves. Moreover, in the description of violence and physical aggression, N = 7 cases provided answers, while N = 5 cases did not formulate a response in this category.

The elements of ACL life in this study were described based on the presence or absence of fourteen items obtained from the PCL-R scores (see Figure 2). Regarding the age of onset, N=13 adolescents reported an age range of 9 to 16 years, with seven having experienced violence before age 12. Six participants reported experiencing domestic violence in childhood, which is considered a risk factor for this development. Notably, the emotional, physical, and psychological abuse was perpetrated by individuals in the roles of father, stepmother, and police. The episode of sexual abuse occurred primarily in girls between the ages of 9 and 13. This fact draws attention to the aspects of running away from home (indicated by N = 5 cases) and the absence of records of behavioral problems before age 12.

The description of the life course (see Figure 2) also helps to understand the presence of internalizing factors. In this context, N = 9 reported feeling guilty for the offense and blaming themselves (N = 6) for the authorship of the offense. As for planning the offense, N = 7 reported committing the offense on impulse, and N = 4 did so after prior planning. Furthermore, this characteristic helps in understanding the perception of the resulting consequences, where N = 8 stated that there were consequences mainly for themselves (because they were deprived of their freedom and were the target of behaviors typical of the socio-educational scene in a closed environment). No case indicated that there were consequences of their actions for others or society. Moreover, the characterization of the aspect of adversity shape these lives also shows the presence of drug use in the family in N = 12 cases; this occurs through the father (N = 7), mother (N = 4), brothers (N = 2), cousins (N = 3) and grandparents (N = 1).

Figure 2. Absolute frequency of characteristics of the life trajectory of ACL homicide perpetrators.



DISCUSSION

To understand neuropsychological aspects and representations of violence in teenage homicide perpetrators, a study was carried out with a mixed-method design. This included neuropsychological evaluation and, subsequently, selection based on the offending act of those whose actions resulted in the loss of life. The data were required to demonstrate the diversity of individual trajectories that encompassed aversive environments, resulting in a non-homogeneous understanding of these individuals. This reality has already been identified as necessary in studies of human development criminology,³ which aids in understanding the environment in relation to adolescent maturation.⁸

Thus, the data indicated that the EFs assessed in the WCST were lower in indicators such as greater use of tests, more significant errors, failure to maintain context, and perseveration, which differ from standardized values. Evidence suggests that executive deficits in offenders are multifaceted and focus on inhibitory control, flexibility, organization, and the ability to adapt responses to the environment.⁹⁻¹² The data from this study corroborate this reality and help to understand the difficulties in self-control among these adolescents.¹⁵ *Self-control* is inferred from levels of impulsivity, which were high in this study, as well as emotional aspects of anger. This data indicates the relationship between impulsiveness, aggression, and low executive functioning in serious infractions,^{10,19,20,22} which may be exacerbated by difficulties in schooling.

Previous literature also highlights that low inhibition is observed in situations of high traits.²⁴ Moreover, it is associated with evidence regarding the reduction of brain mass in aggressors, specifically the presence of emotional brain areas (impulsivity and anger) that are more influential than control areas.³¹ In this study, the presence of high PT was verified,

especially in the factor related to emotion, corroborating evidence that associates PT with low emotional empathy.^{26,35}

Therefore, by understanding the presence of high impulsivity, anger, traits of psychopathy, and low executive functioning, one better comprehend, along with the psychosocial contexts of these individuals, the outcomes of the offending act. Moreover, that corroborates prior knowledge regarding the relationship between high PT and failure in self-regulation,³⁶ along with reduced prosocial emotions.⁴⁰ In these life stories, the presence of substance use and the role of peer influence were also highlighted. It is known that drug use influences EFs and PT, and that peers represent an essential characteristic of this behavior.⁴⁷⁻⁴⁹

The outcome of homicide, the most severe offense, was understood through internalizing acts and adversity-related environmental factors (work, drug use, family), resulting in the identification of concepts about violence with little reflection on the consequences of the act and minimal expression of empathy. Finally, it is emphasized that the peculiar situation of human development is understood. In summary, the trajectories presented here need to be contextualized in a psychosocial framework of precariousness and failure in the state's function of offering and guaranteeing fundamental rights such as education, family support, health, and social security. Understanding the cases presented and what is necessary for management in intervention contexts is essential. Furthermore, new research on the topics of domestic violence and child labor involving this population needs to be developed.

CONCLUSION

The ACL who committed homicide had levels of EFs lower than standardized values, particularly on more tests, with the presence of perseverative responses and a significant failure to maintain context. Anger, impulsivity, and PT were identified as having high values in relation to representations of violence, with little reflection on the damage caused to others and society, and with perceptions centered on the damage to themselves for being deprived of freedom. This reality is compounded by individual trajectories exposed to domestic violence, abuse, exposure to child labor, early personal drug use, family drug use, low educational attainment, a lack of education, and an absence of records of behavioral difficulties before the age of 12. Together, neuropsychological data, representations, and life history contributed to participants' understanding of the interaction between brain maturation and environment. This understanding is critical for neuropsychological practices based on comprehending brain development in light of adverse exposures and effects. It is also noteworthy that this is the first study in Brazil to utilize an explanatory mixed-method approach and a multiple case study design from neuropsychology.

Limitations

Limitations exist regarding instruments that could be more precise for populations with unique characteristics, such as the one in this study. The sample size did not allow for an analysis regarding gender, and it was impossible to achieve qualitative saturation due to the adolescents' low level of verbal expression. However, gaps were identified, such as the need

to investigate inhibitory control in actual contexts of frustration and the exploration of aversive individual trajectories (such as the influence of groups on individual behavior), which may be the subject of future research with this population.

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