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Violence against adolescents in Brazilian capitals based on a survey conducted at emergency services

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Abstract *This study explored the characteristics of violence against adolescents who received treatment at urgent and emergency care centers participating in the 2014 Violence and Accident Surveillance System (*Sistema de Vigilância de Violências e Acidentes, VIVA*) survey and determined the association between demographic variables and the characteristics of violent events. The sample was composed of 815 adolescents who responded to the 2014 VIVA survey. Correspondence analysis was used to determine possible associations between the variables. Victims were predominantly males and the most common form of aggression was the use of firearms and sharp objects. Among males aged between 15 and 19 years, violent acts were predominantly committed in public thoroughfares and by strangers, and the most common injuries consisted of fractures and cuts, while among younger adolescents aged between 10 and 14 years the most common form of aggression was threats made by friends at school. The most common place of occurrence among females was the home. It is concluded that violence against adolescents permeates the chief agencies of socialization – the family and school – demonstrating the need to mobilize the whole society in tackling this problem.*

Key words *Violence, Adolescent, Aggression, External cause, Surveillance*

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Introduction

External causes are the leading cause of morbidity and mortality among adolescents. According to the World Health Organization (WHO), an estimated 875,000 deaths per year among adolescents are due to external causes[1,2]. Studies have shown that violence suffered during childhood and adolescence can have devastating physical and psychosocial consequences and has a direct impact on quality of life[3,4]. Moreover, violence can have lasting health effects, such disability and psychiatric disorders[1]. Besides the toll of human misery, violence against adolescents also results in elevated care costs and is a major public health problem[5-8].

The WHO define violence as "the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation"[6]. Violence is a multifaceted problem associated with economic and social inequality, cultural factors, and the distinctive subjective and behavioral characteristics of different societies[8-10].

In Brazil in 2013, external causes led the admission of 143,070 patients aged between 10 and 19 years to hospitals run by the Unified Health System (*Sistema Único de Saúde* – SUS) and resulted in 18,296 deaths[11].

Studies show high levels of exposure to violence characterized by domination, exploitation, and oppression[10] among children and adolescents within the family and in school and community settings[12]. The most common forms of violence against children are neglect and abandonment, and physical, psychological, and sexual violence, while violence is predominantly committed by parents within the home[13]. The most common form of violence against adolescents is physical violence (assault) inside and outside the home, often committed by strangers and particularly associated with inequality and the use of alcohol and other drugs[8,14].

Adolescents are particularly vulnerable, meaning that it is important to develop health promotion and disease prevention policies and programs specifically geared towards this group[2]. Studies have shown that the continuous monitoring of external causes and violence against adolescents is essential for effective policy implementation[14]. However, studies of violence in this age group tend to be qualitative[9,12], rely on hospital admission and mortality databases[11], and focus on the local level[13] and, as a result, national studies of violence in this age group remain scarce.

In 2006, the Ministry of Health introduced the Violence and Accident Surveillance System (*Sistema de Vigilância de Violências e Acidentes* - VIVA), which has two components: a) A local-level survey conducted in sentinel urgent and emergency care centers (*serviços sentinelas de urgência e emergência*), the most recent of which was undertaken in 2014; and b) Continuing surveillance based on the compulsory notification of domestic and sexual violence and other types of interpersonal and self-inflicted violence.

Studies have shown that violence is more prevalent among young men[6]. However, important aspects of this problem, including the perpetrators, place of occurrence, and forms of violence, remain relatively unexplored. The VIVA survey provides important data on the characteristics and circumstances of violent events involving adolescents in Brazil's state capitals. Warranted by the high levels of morbidity and mortality associated with violence against adolescents, the present study analyzes this data with a view to providing new insights into the problem that help fill these gaps in knowledge, thus providing important inputs to inform policy-making and violence prevention measures.

In light of the above, using the 2014 VIVA survey data, this study explored the characteristics of violence against adolescents and sought to determine the association between demographic variables and the characteristics of the violent event (form of aggression, perpetrators, place of occurrence, and nature of injury).

Methods

A cross-sectional study was conducted using the 2014 VIVA survey data on adolescent victims of violence (n = 815). The survey was conducted in 86 sentinel urgent and emergency care centers located in the Federal District and 24 state capitals. The state capitals Florianópolis (State of Santa Catarina) and Cuiabá (State of Mato Grosso) were not included in the study because the survey was not undertaken in these cities[14]. The VIVA survey used standardized data collection procedures across all centers. To this end, prior to conducting research, local health managers were trained in the use of data collection techniques through a course provided by the Directorate of

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Noncommunicable Disease Surveillance (*Diretoria de Vigilância de Doenças e Agravos Não Transmissíveis*) of the Ministry of Health[14,15].

The study sample was composed of people who sought treatment at the urgent and emergency care centers included in the 2014 VIVA survey. The sample was obtained using single-stage cluster sampling, where the primary sampling unit was 12-hour shifts. The shifts were randomly selected from a total of 60 units calculated based on a 30-day data collection period made up of two shifts per day (one day shift and night shift). The total survey sample comprised 55,950 respondents. The overall sample and collection procedures are described in greater detail in previous publications[14,15].

The present study focused on adolescents aged between 10 and 19 years who had been physically assaulted[3]. The sample was divided into two age groups (10 to 14 years and 15 to 19 years) for comparative purposes.

Correspondence analysis was used to determine possible associations between the variables. This technique allows the researcher to consider a large number of qualitative variables across a wide range of categories[16,17].

Correspondence analysis is a descriptive/exploratory technique that graphically displays associations between variables. The variables are arranged in rows and columns, each of which is depicted as a point. The degree of association between two variables is measured by the distance between the points, where the shorter the distance between the categories row and categories column the stronger the association and *vice versa*[17,18].

Correspondence analysis was conducted using demographic variables (variables column) and the characteristics of the violent event (variables row) included in the standardized form used in the VIVA survey. Variables column: sex and age group (10 to 14 years and 15 to 19 years). Variables row: a) form of aggression (bodily force/beating, firearms, poisoning, sharp/blunt object, threat); b) relationship between victim/perpetrator (father or mother, family member, friend, stranger); c) place of occurrence (at home, at school, recreational area, public thoroughfare); d) nature of injury (without injury, bruise/sprain/joint dislocation, cut/wound, fracture/amputation/trauma) (Chart 1).

Simple correspondence analysis was used to determine the profile of adolescents subjected to

Chart 1. Demographic variables (variables column) and variables related to the violent incident (variables row) in 24 state capitals and the Federal District. September to November 2014.

Demographic variables		
Variable	**Value**	**Description**
0 to 14 years	1 = yes; 0 = no	Aged between 0 and 14 years
15 to 19 years	1 = yes; 0 = no	Aged between 15 and 19 years
Male	1 = yes; 0 = no	Male
Variables related to the violent incident		
bodily force/beating	1 = yes; 0 = no	Form of aggression
Firearm	1 = yes; 0 = no	Form of aggression
Poisoning	1 = yes; 0 = no	Form of aggression
Sharp/blunt object	1 = yes; 0 = no	Form of aggression
Threat	1 = yes; 0 = no	Form of aggression
At home	1 = yes; 0 = no	Place of occurrence
At school	1 = yes; 0 = no	Place of occurrence
Recreational area	1 = yes; 0 = no	Place of occurrence
Public thoroughfare	1 = yes; 0 = no	Place of occurrence
Without injury	1 = yes; 0 = no	Form of aggression
Bruise/Sprain/ joint dislocation	1 = yes; 0 = no	Form of aggression
Cut/wound	1 = yes; 0 = no	Form of aggression
Fracture/Amputation/ Trauma	1 = yes; 0 = no	Form of aggression
Father/Mother	1 = yes; 0 = no	Probable perpetrator
Family member	1 = yes; 0 = no	Probable perpetrator
Friend	1 = yes; 0 = no	Probable perpetrator
Stranger	1 = yes; 0 = no	Probable perpetrator

violence. Given that the data was obtained using a complex sampling design, we first constructed expanded contingency tables (total number of adolescents treated) and, subsequently, based on these tables, we constructed the matching graph. The estimator[18,19] for the total number of adolescents who received treatment related to a violent event in sentinel urgent and emergency care centers over the 30-day period is given by the expression:

$$\hat{Y} = \sum_{h=1}^{L} \sum_{i=1}^{n_h} \sum_{j=1}^{m_{hi}} w_{hij} y_{hij}$$

where:

w_{hij} is the sampling weight in the h-th stratum (nces), i-th emergency care center (shift), and j -th number of elements of the h-th stratum of the i-th emergency care center

y_{hij} is the observed value of the variable (1 if observed and 0 if it is missing) in the h-th stratum, i-th emergency care center and j-th number of elements of the h-th stratum of the i-th emergency care center.

The research project was approved by the National Research Ethics Committee.

Results

The contingency table shown in Table 1 displays the data set expanded according to the sampling weight. The column shows the age and sex of the victims, while the rows display the form of aggression, place of occurrence, nature of injury, and perpetrator. Victims were predominantly males aged between 15 and 19 years. The most common form of aggression among males was bodily force/beating, followed by use of firearm and poisoning, while among women it was bodily force/beating, followed by poisoning. The most common place of occurrence among women was at home, followed by public thoroughfare and at school, while for men it was public thoroughfare, followed by at home and at school. The most common place of occurrence among adolescents aged between 10 and 14 years was at school. The most common injury was cuts and wounds, followed by bruise/sprain/joint dislocation. The most common perpetrators of violence committed against males and adolescents aged between 15 and 19 years were strangers.

Table 1. Variables related to the violent incident expressed in absolute expanded frequencies (*) stratified by age in 24 state capitals and the Federal District. September to November 2014.

Variable	Age (years)		Sex	
	10 to 14	15 to 19	Male	Female
Form of aggression				
Bodily force/beating	388	774	685	477
Firearm	54	423	449	27
Poisoning	30	412	334	108
Sharp/blunt object	108	162	183	87
Threat	38	14	25	27
Place of occurrence				
At home	166	379	238	307
At school	185	76	162	99
Recreational area	38	82	110	10
Public thoroughfare	178	985	916	248
Nature of injury				
1-Without injury	93	56	40	110
2-Bruise/sprain/joint dislocation	222	378	357	242
3-Cut/wound	201	901	864	238
4-Fracture/Amputation/Trauma	72	318	290	100
Perpetrator				
Father/mother	56	52	26	82
Family member	102	136	134	104
Friend	293	398	498	194
Stranger	144	944	896	192

(*) Expanded frequencies.

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Table 2 shows the results of the correspondence analysis. The first column shows the number of dimensions necessary to explain 100% of joint variation for the two variables. The last two columns show the simple and cumulative proportion of explained variance for each dimension. The two first dimensions explain 100% of total variation (first dimension 84.6% and second 15.4%). The results of the chi-square test of independence show that the null hypothesis of independence between the row and column variables can be rejected. Therefore, it can be concluded that there is an association between demographic variables and the characteristics of the violent event.

Table 3 shows the characteristics of the violent event and demographic variables that make up each dimension. Form of aggression was the

Table 2. Dimensions, proportion of explained variance in the correspondence analysis.

Dimension	Singular value	Inertia	chi2	% explained variance	% accumulated explained variance
1	0.30	0.09	1632.58	84.63	84.63
2	0.13	0.02	296.48	15.37	100.00
3	0.00	0.00	0.01	0.00	100.00
Total		0.11	1929.07	100.00	

Table 3. Characteristics related to aggression among adolescents and the variables that make up each dimension.

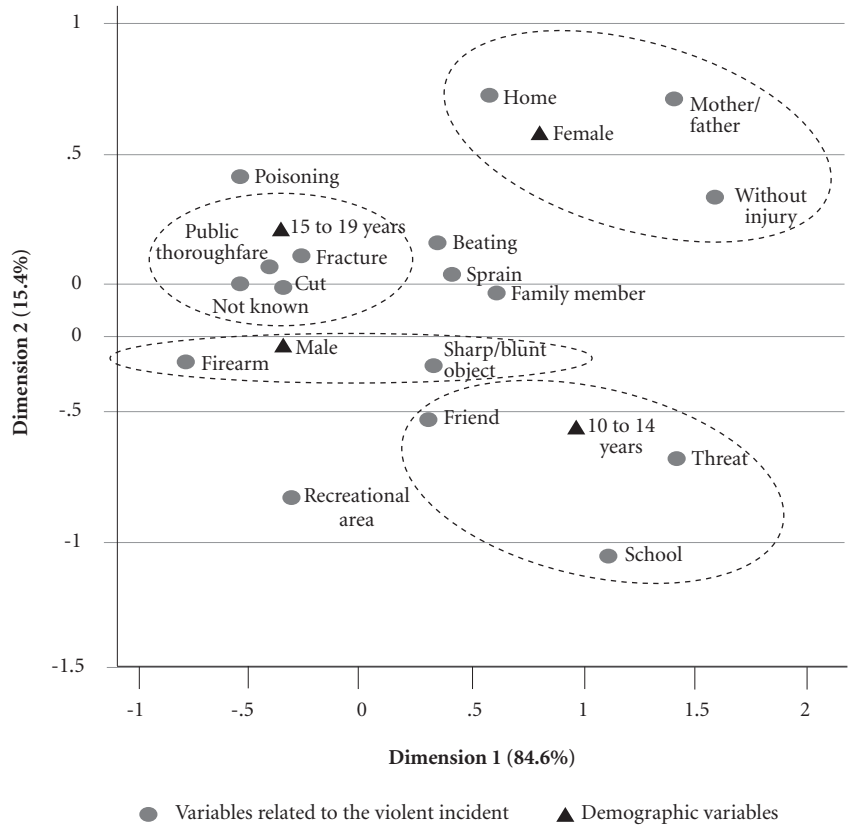
Category	General			Dimension 1			Dimension 2		
	mass	quality	% inertia	coord	sqcorr	contrib	coord	sqcorr	contrib
Violence									
Form of aggression									
Bodily force/beating	0.131	1.000	0.049	0.352	0.922	0.053	0.157	0.078	0.025
Firearm	0.054	1.000	0.099	-0.787	0.936	0.110	-0.315	0.064	0.041
Poisoning	0.050	1.000	0.050	-0.533	0.793	0.047	0.417	0.207	0.067
Sharp/blunt obj	0.030	1.000	0.013	0.329	0.711	0.011	-0.321	0.289	0.024
Threat	0.006	1.000	0.036	1.411	0.911	0.039	-0.675	0.089	0.021
Place of occurrence									
At home	0.062	1.000	0.096	0.575	0.592	0.067	0.732	0.408	0.255
At school	0.029	1.000	0.139	1.102	0.718	0.118	-1.056	0.282	0.254
Recreational area	0.014	1.000	0.015	-0.298	0.230	0.004	-0.836	0.770	0.073
Public thoroughfare	0.131	1.000	0.062	-0.408	0.989	0.072	0.065	0.011	0.004
Perpetrator									
Father/mother	0.012	1.000	0.074	1.403	0.899	0.079	0.722	0.101	0.049
Family member	0.027	1.000	0.028	0.605	0.998	0.032	-0.040	0.002	0.000
Friend	0.078	1.000	0.045	0.302	0.436	0.023	-0.526	0.564	0.167
Stranger	0.123	1.000	0.093	-0.521	1.000	0.110	0.009	0.000	0.000
Nature of injury									
Without injury	0.017	1.000	0.120	1.583	0.981	0.139	0.333	0.019	0.014
Sprain	0.068	1.000	0.033	0.417	0.998	0.039	0.028	0.002	0.000
Cut	0.124	1.000	0.040	-0.339	0.999	0.047	-0.014	0.001	0.000
Fracture	0.044	1.000	0.009	-0.259	0.930	0.010	0.109	0.070	0.004
Demographic									
10 to 14 years	0.134	1.000	0.393	0.959	0.872	0.405	-0.563	0.128	0.328
15 to 19 years	0.366	1.000	0.144	-0.350	0.872	0.148	0.205	0.128	0.119
Male	0.350	1.000	0.138	-0.340	0.816	0.134	-0.247	0.184	0.165
Female	0.150	1.000	0.325	0.798	0.817	0.314	0.579	0.183	0.387

variable that contributed most to dimension 1 (26%), followed by perpetrator (24%) and nature of injury (24%). The demographic variable that contributed most to dimension 1 was age (55%). Place of occurrence was the variable that contributed most to dimension 2 (59%), followed by perpetrator (22%). The demographic variable that contributed most to dimension 2 was sex (55%).

Figure 1 shows the association between the demographic variables and characteristics of the violent event in both dimensions. Dimension 1 explains 15.4%, while dimension 2 explains 84.6%. The distance between points shows the following associations: A) being female and the variables place of occurrence at home, perpetrators being parents, and less serious violence or without injury; B) being male and the variables form of aggression firearm and sharp object. C) Being aged between 15 and 19 years and the variables nature of injury fracture and cuts, place of occurrence public thoroughfare, and perpetrator being a stranger. D) Being aged between 10 and 14 years and the variables form of aggression threat, perpetrators being a friend, and place of occurrence at school.

Discussion

The findings of the present study show that victims of violence were predominantly males. Previous studies have highlighted that being male is a predictor of violent behavior[11,20,21]. Culturally enrooted gender differences are suggestive of a male-chauvinist perspective that manifests



coordinates in synmetric normalization

Figure 1. Biplot of the 24 state capitals and the Federal District. September to November 2014.

itself in the games children play. While boys prefer to play with guns and swords, girls play with dolls, meaning that boys have a natural tendency towards domineering and aggressive behaviour[10,21-23]. Authors also highlight that factors such as stimulation and the fact that boys tend to be given greater freedom outside the domestic walls may result in greater exposure to risk in all age groups from childhood to adulthood[10,21-23].

The present study shows that older adolescents (those aged between 15 and 19 years) are more susceptible to violence committed in public thoroughfares, which is consistent with the findings of other studies[1,11]. This reflects lifestyle habits such as going out, partying, and clubbing more often than girls, meaning that male adolescents are more exposed to risk in public spaces, as shown by other studies[24-27]. Girls, on the other hand, are more likely to suffer violence at home, which is consistent with the findings of previous studies showing that the most common perpetrators of violence against children are parents or the mother's boyfriend or partner[27-30].

Studies show that violence against girls committed at home by parents creates a "vicious circle" of domination, causing fear, anguish and silence, and often leading to fatalities[29,30]. Schraiber et al.[29] suggest that gender differences in the effects of exposure to violence exist. In the case of girls, acts of violence are transformed into common everyday occurrences, while among boys, they generally perpetuate macho behavior, turning the victims into future perpetrators[29,30]. These gender differences reflect a cultural tendency to trivialize and accept violence[29].

In the category nature of injury, violent events were predominantly without injury among girls and threats among boys aged between 10 and 14 years. However, more serious injuries were observed among male adolescents aged between 15 and 19 years, such as bodily force/beating, fractures, cuts, and sprains. The majority of violence against this age group was committed in public thoroughfares and the perpetrators were predominantly strangers. As shown by previous studies[11,26], the greater vulnerability of older male adolescents and young men to violence is due to male super-mortality and the fact that men are at increased risk of violence.

This is the first study of the VIVA survey to observe statistically significant levels of violence in the form of threats committed against younger adolescents (aged between 10 and 14 years) by friends at school. Bullying consists of threats and insults made by friends or classmates, but can also involve the use of physical force[32]. This problem has been studied by surveys of adolescents, such as the National School Health Survey (*Pesquisa Nacional de Saúde do Escolar* -PeNSE)[31,32]. Studies have shown that there is a significant association between violence experienced by adolescents and involvement in acts of violence at school, either as victims or perpetrators[33].

Despite not including specific questions about this issue, the findings of the VIVA survey were consistent with those of other studies that showed that violence against school children in the form of threats and the use of fear particularly affects younger adolescents[31,32] It is also important to note the fact that victims sought treatment at urgent and emergency care centers, probably suggesting that they were victims of more serious violent events resulting in injury, thus demonstrating that tackling violence at school should be a priority.

The problem of violence between adolescents highlighted by the present study gains even greater importance when we consider both the immediate and long-term consequences of violence, not only for the individual victim, but also for society as a whole. Violence committed against adolescents at home is associated with the development of aggressive behavior[34] and mental disorders[34,35]. Violence against adolescents, in whatever form, is associated with aggressive behavior and, therefore, leads to more violence[36].

Acts of violence against children and adolescents are an obstacle to individual development and constitute a major public health problem. The Child and Adolescent Statute (Law 8.069/1990)[37] provides special rights and full protection to adolescents and requires the compulsory notification of suspected and confirmed cases of violence and maltreatment of children and adolescents by health professionals. The statute provides that *it is the duty of the family, community, general society, and the government to ensure, as an absolute priority, the protection of the rights to life, health, food, and education,* meaning that it is absolutely imperative that the government advances protection measures.

The present study innovated by using correspondence analysis, a technique which allows for the graphical display of associations between a wide array of variables[18].

One of the limitations of this study is the possible omission of information regarding violent events by adolescents and/or their parents or guardians due to the delicate nature of this issue. Furthermore, on the one hand, the use of urgent

and emergency centers as the primary source of data has its advantages because these centers are specialized in treating patients involved in incidents involving external causes. On the other hand, they do not necessarily offer a true representation of the target population. However, in the majority of the capitals included in this study, public hospitals are referral centers for incidents involving external causes and we therefore believe that the sample serves as a proxy for the target population. Finally, it is important to note that the methodology used in this study is best suited to exploratory research, hence further research could complement our findings.

Based on the study findings, it is recommended that the next editions of the VIVA survey include specific questions regarding bullying, which was shown to be common at school, especially among younger adolescents.

Conclusion

Violence against adolescents is a major public health problem. Our findings show that victims were predominantly males aged between 15 and 19 years and that violent acts were predominantly committed in public thoroughfares and by strangers, while among younger adolescents aged between 10 and 14 years the most common place of violence was the school. The most common place of violence against female adolescents was the home. The VIVA survey is a vital instrument for bringing greater visibility to this issue. The present study highlights that violence occurs in the chief agencies of socialization – the family, school, and community – demonstrating the need to mobilize the whole society in tackling this problem.

Collaborators

DC Malta participated in study conception, data analysis and interpretation, carried out the literature review, and contributed to the critical revision of this manuscript and final approval of the version to be published. RTI Bernal participated in data analysis and interpretation and the final revision of this manuscript. FSF Pugedo, CM Lima, MDM Mascarenhas, AO Jorge, and EM Melo contributed to the critical revision of this manuscript and final approval of the version to be published. All authors approved the final revision of this manuscript.

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