The Effects of Criminal Embeddedness on School Violence in Brazil

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Abstract: This study examines the influence of criminal embeddedness on the intensity of criminal behavior among primary and secondary school students in a large Brazilian city. A database conceived by the Center for the Study of Crime and Public Security at the Federal University in Minas Gerais is used to analyze the involvement of youths displaying delinquent behavior at home or at school and how school performance and peer relationships are effected. Based on differential association and learning theories, the main hypotheses are (1) the greater the criminal embeddedness, the lower the degree of school satisfaction as well as future expectation of continued higher education, and (2) the greater the criminal embeddedness, the greater the risk of the intensity of deviant and criminal behavior. Applying statistical linear and nonlinear regression models, findings indicate that the criminal embeddedness has a negative and statistically significant association with the student's level of school satisfaction.

Keywords: Delinquent behavior, School violence, Criminal embeddeness, School satisfaction, Brazil.

INTRODUCTION

With respect to economic action, Mark Granovetter's (1985) well-known distinction between over-socialized and under-socialized perceptions of social action could very well gain a renewed relevance within the field of criminology in the search for a third theoretical stream. Granovetter (1985) argues, on the one hand, that sociologists overestimate the power of institutions to frame and model preferences and the calculation of utilities, and on the other, that economists underestimate the power of socialization over economically oriented behavior. Consequently, social action would be less established than holistic sociologists believe (Parsons and Smelser, 1956) and more socialized than neoclassical economists believe (Jevons, 1888). For Granovetter (1985), social action is embedded in networks of interactions that make up a social process in which individuals and structures are not taken for granted. In attempting to overcome the old action/structure opposition, like so many others in the sociological tradition (Bourdieu, 2000; Giddens, 1984), network interactionism assumes that the central problems are the social process, how social formations emerge, and how the social world achieves order and rationality (White, 2008).

This discussion about the theoretical extremes focused on the process of social formation and social order brings the network analysis close to studies of the etiology of crime. Similarly, criminology has been permeated by the debate of the individual/structure dichotomy. On the one hand, macro or structural theories start from the point of view of aggregate factors related to the community, population, or groups to explain the different variations between their crime rates (Bursik and Webb, 1982; Brantingham and Brantingham, 1984; Wilcox, Land and Hunt, 2003; Sampson, 2012). On the other hand, the level of explanation focuses on interpersonal or psychosocial factors and their association with criminal behavior (Sutherland, 1947). In the latter case, the theoretical argument is that criminal behavior is constructed through a process in which the individual acquires skills and recognition among his/her peers.

This paper seeks to contribute to the discourse by joining the set of studies that propose integrating these two major fields of investigation: criminology and network analysis (Radil, Flint, and Tita, 2010; Weerman, 2011). Our hypothesis is that modern society is comprised of identities that emerge in a complex network of interrelations, where deviant behavior is one of the possible alternatives: a type of behavior socially constructed through a communication process that social agents establish in their circles of relationships–in this particular case, family, friends, and the school environment.

To that end, we focus on ascertaining how crime occurs in terms of the social relations process rather than on the investigation of why and where it occurs. At this point, the idea of criminal embeddedness has an important heuristic power in regards to which networks

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of interaction the criminal–or potential criminal–is embedded. How does the network of interactions disseminate and influence criminal behavior among individuals? To what extent is social space linked to physical space? How do social relations create barriers or porosity effects in circulation in physical space?

Specifically, the authors investigated the effect of delinquent involvement (identified in family or friends within the context of schools) on the behavior of individuals in terms of their school satisfaction and peer relationships. The delinquent behavior is measured according to the usage of illicit substances and criminal activity.

Although most research findings, particularly in the case of individual-level theories, seek to demonstrate that individuals commit crimes in the company of their peers (Warr, Stafford 1991; Warr 1993; Warr, 2002), only recently have empirical studies sought to integrate the structure of network analysis into their models (Weerman, 2011). Part of this omission is due to methodological difficulties in planning surveys capable of capturing information about social interactions. This absence of the structure of relationship networks points to a weakness in empirical models that could be using it with a mediator variable between individual characteristics and the outcome of the crime or deviant behavior.

Thus, the theoretical linkage of the analysis of social networks to the criminological approaches used here intends to contribute to the discussions about juvenile delinquency. It also suggests the need to incorporate sociometric techniques in future research that seeks to assess structural effects on deviant behavior.

Social Influence and Deviant Behavior: Differential Association Approach

Many studies have shown that individuals with antisocial behavior tend to have antisocial friends (Farrington and Loeber, 2000; Hawkins *et al*., 1998). An important theoretical perspective in criminology is based on the assumption that criminal behavior is learned through interaction with others in the communication process. Crime is ultimately the result of a dynamic process of interactions that produces, among other things, individual acts of crime.

The original version of the theory developed by Edwin H. Sutherland, which later became known as differential association theory, argues that "the specific causal process in the development of systematic criminal behavior" occurs through a particular social interaction, or differential association[1] (Sutherland, 1947). According to this approach, deviant behavior is constructed through stages in which the individuals, within their circles of relationships, learn skills and techniques to commit crimes.

By presenting a set of nine propositions related to the process through which an individual starts to engage in criminal behavior, Sutherland highlights the symbolic character of the interactions in which the learning of delinquent behavior occurs. According to Sutherland's differential association theory, criminal and normative associations[2] are equally learned, but opposing forces unbalance the relationship to the extent of favoring greater contact with one of these types of behavior patterns. For certain individuals, the relationships established in the course of their life assume a differential character, presenting them with the unconventional alternatives of deviant behavior. In this context, the frequency, duration, prioritization and intensity of this type of relationship will determine the type of behavior adopted by the individuals in the process of interaction and communication with others with whom they establish definitions, rationalizations, and attitudes favorable (or not) to the commission of crime.

According to Sutherland (1947), criminal behavior occurs when the individual learns an excess of definitions favorable to violation of law over definitions unfavorable to violation of law. It is interesting to note that the pattern of differential association and exposure to definitions may vary not only as a result of their socialization process, but also as a consequence of the structural dimension where the individuals are situated. That is, the existence of a type of "differentiated social organization" determines the crime rates among groups or communities that are influenced by the probability of their members being exposed to antagonistic definitions. This is consistent with the fact that differential association is construed as a socio-organizational expression of normative conflict at the group level (Sutherland and Cressey, 1955).

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[1]While society defines the legal codes to which behaviors must conform, some groups react in the condition of normative conflict (threat to values, interests, and beliefs) by engaging in a type of behavior defined as crime. With respect to crime, differential association refers to excessive associations with patterns of criminal behavior among individuals.

[2]We use the normative term to differentiate it from behaviors or attitudes associated with offenses or deviances from the normative standard or the legal codes of society.

Many studies suggest that an individual's criminal activity is positively associated with the time spent in unstructured socialization with peers in the absence of authority figures (Osgood *et al*., 1996). Deviant behavior is also more likely to occur in the absence of an authority figure—specifically, someone whose role in a given situation entails the responsibility of exercising social control in response to the deviant behavior in question (Gibbs, 1977, Osgood *et al*., 1996). It is assumed that the situation in which individuals whose parents have already been arrested or detained for violation of law represents exactly the opposite of the aforementioned control. In reality, the process in which an individual "gains" the knowledge and skills to commit crimes involves a process of social learning, as discussed below.

The Criminal Learning Process

Although differential association theory has insisted that criminal behavior is learned rather than directly imitated, it has not offered robust explanations about the processes through which this learning takes place. This led the differential association theory to be reformulated while retaining Sutherland's (1947) original propositions. Behaviorist and social learning theories (Bandura, 1977, Bandura *et al.,* 2008) have helped authors such as Burgess and Akers to better specify the principles of social learning theory applied to criminal or deviant behavior in general (Burgess and Akers, 1966; Akers, 1977; 1998). This reformulation, which does not compete with differential association theory, provides a more complete explanation of the concepts, responding to criticisms directed at the original arguments and allowing the main propositions to be empirically tested.

Thus, social learning theory retains the elements of symbolic interactionism present in the original conceptualization of Sutherland's theory (1947). It considers and operationalizes elements related to motivation, or stimulus to criminal behavior, and redefines the theory around four concepts: (1) differential association; (2) definitions; (3) differential reinforcement; and (4) imitation.

According to the social learning approach, a person is more likely to be involved in crime and, conversely, less likely to conform to the norm, when there is an imbalance between these social "forces." This imbalance leads the individual to deviance, rendering him or her more exposed to definitions favorable to committing a crime. Theoretically, relationships whose symbolic representations give off signs in favor of attitudes (definitions) and behaviors (models) that refer to the deviance to a greater extent incorporate patterns that begin to be followed routinely and stem from the process of differential association. This generates greater potential to influence the behavior of individuals when observed in the interaction between reference groups, particularly in primary groups such as family and close friends.

Besides this factor, another three factors should be pointed out due to their contribution to the process under discussion. Elements that guide the actions of individuals are called definitions. These are are responsible for classifying the action of committing crimes in the dichotomous categories of right or wrong, good or bad, desirable or undesirable, justified or unjustified. According to the theory, these definitions are general when they are based on religious and moral norms and values favorable to conformist (normative) behavior and are specific when they orient an individual towards committing particular criminal acts or series of acts. But this choice for one type of behavior (criminal) over another (conforming), for example, is largely due to an anticipated or experienced expectation of rewards arising from a consequence of the behavior. In this context, the individual's evaluation of these possibilities takes into account a temporal logic of the rewards or punishments that had been received in the past, may be received in the present, and will be received in the future. Last but not least, the adoption of behaviors through observation refers to the imitation process affected by the characteristics of the model, the behavior itself, and the observed consequences of the behavior that will translate into differentiated reinforcement of approval depending on the reference group.

In view of the above, Akers (2000) does not disregard the effect of social structure on shaping deviant behavior. This macro level would have an indirect effect on the mechanisms that make up social learning. By considering these elements of social structure, the theory exposes a possibility for understanding the variation in levels of exposure to criminal associations, models, definitions, and reinforcements that encourage or prevent deviant behavior. As a result, the differentiated social organization will determine to a greater or lesser extent the probability of committing a crime.

Crime and Social Proximity Structures: Methodological Aspects and Limitations

Faced with differential association and learning theories, sociological research explores the risk of being tied to a series of theoretical dualities and

methodological weaknesses. First, it is necessary to point out some tensions between Sutherland's (1947) interactionist perspective and the social learning studies of Burgess and Akers (1966) and Bandura (1977). On the one hand, symbolic interactionism insists on the contextual character of every social action. The meanings attributed to action are always pervaded by mutual expectations and interpretation of the social context. In this sense, the Self is an active and dynamic reality in a complex of relationships. But on the other hand, the behaviorist bias of criminal learning theories assumes operant conditionings that reinforce the rational calculation of expected rewards and the risks of punishment. In what ways do repeated interactions in certain contexts end up forging operative behaviors and a rational logic of action? How is the criminal habitus forged, to use Bourdieu's (2000) term and the concept? Answering these questions requires identifying interaction or social proximity structures that should not be mistaken for structures in the macro-social sense as social classes. Therefore, this study focuses on identifying causal mechanisms of proximity that mediate the relationship between the under-socialized individual and his or her abstract rational calculation and the over-socialized individual who has already internalized norms and values. However, the biggest problem for studying criminal or deviant behavior using proximity data is the difficulty of obtaining dyadic or relational information, since knowing social links and relations in deviant practices implies denouncing the alters of a phenomenon whose nature is secret and concealed. In extreme situations, "snitching" on accomplices implies breaking the loyalties that shape this type of behavior, which is naturally a "networked" phenomenon (Papachristos, 2014), with risks to the integrity of the persons involved in the research.

In less extreme situations, and seeking more preventive interests, another type of research aims to understand the social space of the school as a place conducive to the reproduction of criminal or risk behavior. For example, some social psychology studies try to explain risk behaviors–e.g., drug use–based on intra-school social relations (Beier, 2014). This type of research seeks to capture isolated students in networks of mutual recognition and correlates this information with the propensity to use drugs.

Problematic Situation and Application on Real Data Set

According to UNODC estimates, approximately 37% of deaths in Latin America and the Caribbean in 2017 were caused by intentional homicides. Although there are disparities in the number and characteristics of victims worldwide, the Americas maintain a relative stability of homicide rates at a constantly high level over the last 30 years. The two most populated countries, Brazil and Mexico, account for the highest number of homicides in absolute numbers, and only Brazil, which makes up around 2.7 percent of the global population, accounted for 13.8 percent of global homicides (Vienna, 2019).

In this context, young men aged 15–29 years face the highest risk of homicide, making the homicide rates among young men in Latin America and the Caribbean (LAC) the highest in the world. However, these young people, in general, start a criminal career long before they become murder victims. Therefore, we highlight the importance of considering the process of Criminal Embeddedness to which they are exposed as both a predictor of deviant and criminal behavior and, on the other hand, as a signal of low school satisfaction and expectations for their future.

This paper used a database developed by the Center for the Study of Crime and Public Security (CRISP/UFMG) as part of the study "Social losses caused by violence: violence in schools".[3] The study, which was conducted in Brazil in 2005, involved public, state, and municipal schools as well as individuals from the metropolitan areas of Belo Horizonte, Betim, Contagem, Santa Luzia, Ribeirão das Neves, and Ibirité. The aim was to describe how the violence and crime phenomenon occurs within schools. Questionnaires were issued to the principals, teachers, and students of the selected schools. The student database consists of 3,568 primary and secondary school students. A stratified random sample was used to select the schools in each of the municipalities. Then, a random sampling by conglomerates was carried out in two stages. The schools were selected in the first stage and the students in the second stage[4]. The margin of error of the survey is +/-1.7%, with a confidence level of 95%.

Criminal Embeddedness: The Intensity of Criminal Involvement

It is important to point out that the questions used in the aforementioned 2005 survey were not designed for

[3]The research "Social losses caused by violence: violence in schools" was funded by the State Secretariat of Education and had the participation of researchers from the Center for Studies on Crime and Public Security (CRISP) of the Federal University of Minas Gerais.

[4]Technically, this sampling process is called subsampling.

the purpose of analyzing social networks. However, we found a set of variables with some potential to be operationalized as proxy of relational proximity structures. We reconstructed the dyadic data of schools in this study, and that enabled us to capture the extent of criminal involvement (or criminal embeddedness). Hagan (1993) introduced the concept of criminal embeddedness, which refers to involvement in ongoing criminal networks, and which was very important to this study. These ongoing criminal networks are restricted to deviant family members and close friends. The point is that these individuals comprise a special network in which an individual is exposed to definitions unfavorable to respecting the law—that is, the particular set of relationships geared to criminal values, acts, and opportunities.

The survey used questions concerning relationships established with friends, siblings, fathers and/or mothers. Each of the questions asked whether the person (alter) with whom the respondent had a relationship had been temporarily detained by the police, arrested for having committed a more serious offense, or had never had problems with the law. Taken together, the three questions point to two types of social ties that link the respondent to delinquent behaviors: kinship and friendship. The first is a fixed relational pattern and the second is a variable relational pattern. Let us say that no one chooses his or her parents and siblings, but does choose his or her friends. Both types of ties foster long-lasting and intense ties, from an affective and normative point of view, without determining them. But in the lives of adolescents and young people we know that the climate of trust among friends is not necessarily the same as that in parental relationships. Parents are not necessarily the good confidantes of their children, as is reflected in the proverbial statement: "My parents are not my best friends." At the limit, these questions enable the reconstruction of a self-centered micro-network for each respondent with the following characteristics:

- Represented relationship: “Knowing someone who has committed an offense,” which overlaps two other relationships–kinship and friendship.
- This is an unguided relationship, as imposed by the nature of the tie. In fact, in the family everyone knows each other. Friendship implies knowing one another.
- The attribute of kinship imposes the transitivity typical of strong ties, according to Granovetter's (1973) forbidden triad.
- The attribute of friendship does not enable inferring an assumption of transitivity, the family unit does not necessarily know a friend who commits crimes.

The ties established in this network of relationships enabled the construction of a categorical variable that represents the intensity of the ties. Respondents who answered having no relationship with persons who had been detained or arrested were assigned a value of 0. Those who declared having a relationship with persons who had been detained or with persons who had been arrested were assigned a value of 1 and a value of 2, respectively. This, therefore, is an independent variable of fundamental importance for the survey proposed in this study.

Dependent Variables

Given the composition of the questionnaire used to survey the available database (CRISP-2005), other variables that could be associated with criminal embeddedness were reconstructed. The study focuses on two types of students’ life behavior in distinct but intrinsically related fields. One is related to their level of satisfaction with the school and the other to what is called deviant and criminal behavior, which incorporates attitudes in relation to law and social norms. In the first case–satisfaction in the school environment–a continuous variable was constructed that captures students’ satisfaction with the school, the school’s principal, and most of their teachers. In all questions, a Likert scale ranging from 0 to 10 (where 0 means “does not like it” and 10 “likes it very much”) was presented to the students, who answered each item. Basically, the construct was developed by adding up the answers to each of the items so that the final scale representing the students’ satisfaction varied from 0 to 30. The questions related to deviant and criminal behavior were converted into binary or indicator variables and were more sensitive with respect to the threshold of what is being addressed in this research as deviance or crime. That is, in a set of questions concerning the use of legal or illegal substances/drugs (deviant behavior) as well the presence of certain attitudes (criminal behavior), the decisive point to define this threshold was the existence of only one positive answer by the student in each of the categories.

With respect to deviant behavior, the original questionnaire presented the students with a list of nine types of substances, among them substances that are

legal or that can be legally used by adults, and substances that are illegal or prohibited for the general population. For each of these substances the students were offered four possible answers: never used; experimented with; used but stopped using; and, finally, is using. If the students answered that they had never used any of the substances, in the new variable the respondent is identified as having no deviant behavior; otherwise, they were included in the group of students with deviant behavior. Because of the types of substances presented in the survey, the groups were divided between those who have deviant behavior for legal drugs (alcoholic beverages and cigarettes) and those who have deviant behavior for illegal drugs (poppers, marijuana, solvents, ecstasy, injectable drugs, cocaine, and crack cocaine). Likewise, for criminal behavior an indicator variable was reconstructed from the original questionnaire to capture if at any time the respondent had had some type of attitude associated with acts of violence.

The original scale of seven items investigated is composed of the following questions: (1) whether the student had ever brought a firearm to school; (2) whether he/she had ever brought any weapons other than firearms (knife, pocket-knife, razor, club, etc.) to school; (3) whether he/she had ever attacked someone at school; (4) whether he/she belongs to a gang; (5) whether he/she had ever been involved in gang fights; (6) whether he/she had ever stolen something at school; and (7) whether he/she had ever mugged someone at school. If the respondent answered positively to at least one of the questions listed, he/she was considered a student with criminal behavior.

Measures of Aggressiveness and Disorder

Two questions were used to control the analysis and associations made from the operationalization of the variables. The first seeks to measure the mutual student/teacher violence ratio. In this case, the original questionnaire asked the students whether their teachers had ever verbally attacked them. They were also asked whether they had ever attacked a teacher with words or name-calling throughout their school years. Positive responses to both questions were used to create a binary variable indicative of mutual aggression. The other control measure refers to the perception of physical and social disorder in the school or in its immediate surroundings. Students were asked to answer 17 questions about the existence of situations associated with social disorder. This included violent altercations among students, drug sale and use, presence of criminals or armed students, and the use of alcoholic beverages, as well as physical disorder such as destruction of property, graffiti, and bomb blasts, both inside and outside the school. The simple sum of the answers to all questions produced a scale variable ranging from 0 to 17 points. Finally, the entire statistical modeling was controlled by variables intrinsic to the respondents: sex, race, and socioeconomic status. The latter was represented by a continuous variable resulting from the analysis of the main components of a set of 8 questions about household possession of durable goods.

Hypotheses of the Study

As a result of the theoretical predictions of both differential association of crime and learning theories, and after operationalizing a crime embeddedness proxy as a relational proximity structure, the following hypotheses can be postulated:

- All other things being equal, the greater the criminal embeddedness, the lower the degree of school satisfaction and the expectation of future continued education.
- All other things being equal, the greater the criminal embeddedness, the greater the deviant behavior and the criminal behavior.

Probabilistic Models

To test our hypotheses, statistical linear and nonlinear regression models were used, depending on the type of response variable. This statistical modeling enabled assessment of the effect of the functional relationship between the independent or causal variables on the response variables.

In the first part of our analysis, the objective is to describe the relationship between the explanatory variables (Sex, Race, Age, Socioeconomic Status, Mutual Aggression, Perception of Disorder, and Criminal Embeddedness) over the dependent variable (School Satisfaction), in which the effect of criminal embeddedness with school satisfaction life on was assessed. This relationship is established by two ordinary least square models:

Model 1

Estimated school satisfaction = 25.647 + 0.668. Sex + 0.654. Raça - 0.251. Age - 0.294. Socioeconomic status - 2.487. Mutual aggression - 0.333. Perception of disorder.

Model 2

Estimated school satisfaction = 25.539 + 0.644. Sex + 0.418. Raça - 0.219. Age - 0.218. Socioeconomic status - 2.429. Mutual aggression - 0.321. Perception of disorder - 0.691. Criminal embeddedness.

In the second part of our analysis, when binary or dichotomous variables are used as an answer in our model, we employ logistic regression models. This technique is useful for estimating the probability of an event (for example, deviant behavior, shown below) as a function of predictor variables (Sex, Race, Age, Socioeconomic Status, Mutual Aggression, Perception of Disorder, and Criminal Embeddedness). The association measure calculated, in this case, is the odds ratio. All other things being equal, this ratio is obtained by comparing individuals that differ only in the characteristic of interest. Logistic regression models calculate the probability of the effect based on the following equations:

Model 1 – Deviant behavior for licit drugs

$$\hat{\pi}_i = P(\text{licit drugs}_i = 1) = \frac{1}{1+e^{-\hat{\eta}_i}},$$

which can be rewritten, to facilitate interpretation of the coefficients from the odds ratios obtained by e^{β}, as follows

$$logit(\hat{\pi}_i) = ln\left(\frac{\hat{\pi}_i}{1-\hat{\pi}_i}\right) = \hat{\eta}_i$$

Wherein $\hat{\eta}_i$ is the estimated predictor expressed by

$\hat{\eta}_i$ = -4.187 + 0.418. Sex + 0.031. Raça + 0.306. Age + 0.221. Socioeconomic status + 0.859. Mutual aggression + 0.064. Perception of disorder - 0.033. School satisfaction

Model 2 - Deviant behavior for illicit drugs

$$\hat{\pi}_i = P(\text{ilicit drugs}_i = 1) = \frac{1}{1+e^{-\hat{\eta}_i}},$$

Or, rewritten as follows

$$logit(\hat{\pi}_i) = ln\left(\frac{\hat{\pi}_i}{1-\hat{\pi}_i}\right) = \hat{\eta}_i$$

Wherein $\hat{\eta}_i$ is the estimated predictor expressed by

$\hat{\eta}_i$ = -5.087 - 0.377. Sex - 0.038. Raça + 0.205. Age + 0.321. Socioeconomic status + 0.704. Mutual aggression + 0.002. Perception of disorder - 0.019. School satisfaction + 0.814. Criminal embeddedness

In this case, the dependent variables are deviant behavior (licit and illicit drugs). The independent variables used in the model are sex, race, age, socioeconomic status, mutual aggression, perceived disorder, and criminal embeddedness (both model 2).

Logit's models for the criminal behavior as a dependent variable are similarly equated with the estimated coefficients presented in Table **5**, respectively.

The rationale for using the logistic model is fundamentally due to the fact that our interest is in estimating the risk of the student adopting a particular type of behavior, whether deviant or criminal, due to a set of factors, mainly because he/she is involved in a network of criminal embeddedness formed by relatives or friends. Thus, this methodology allows us to estimate the odds ratio (OR) or number of times that the characteristic of a given individual affects the probability of the response. As shown by Long and Freese (2001), this odds ratio can be converted into a percentage, called percentage change in odds, expressed by the following equation: 100 * [OR - 1]. In this study, all statistical analyses were performed using the PASW Statistics, version 18.

RESULTS[5]

The descriptive statistics presented in Table **1** show typical gender differences associated with the two dimensions of interest in this study: education and criminal deviance. In both cases, as can be seen, female students reported better levels of school satisfaction and a lower proportion of involvement in delinquent behaviors associated with illicit drugs and crime. This difference between genders also holds true in regards to criminal embeddedness. Interestingly, the study found a higher proportion of delinquent behavior related to legal drugs (cigarettes and alcoholic beverages) among female respondents. Mean differences (t-tests) were implemented for all variables and indicate statistically significant differences for all variables except race.

[5]Given that the main interest of this study is to assess the effect of interpersonal relationships characterized by criminal involvement on the students' school life and deviant behavior, we excluded from our analyses 18 cases whose respondents were 25 years or older, which represents 0.5% of the sample.

Table 1: Mean Differences between Men and Women

	Men				Women				
	Minimum	**Maximum**	**Mean/ Proportion**	**Std. Deviation**	**Minimum**	**Maximum**	**Mean/ Proportion**	**Std. Deviation**	**t-test for Equality of Means**
Age	7	52	14.49	2.98	10	65	14.97	4.44	.000
Race (whites)	.00	1.00	.33	.47	.00	1.00	.33	.47	.802
Socioeconomic status	-1.47	5.77	.08	1.00	-1.47	7.65	-.07	.99	.000
School satisfaction	.00	30.00	19.12	7.05	.00	30.00	20.18	6.90	.000
Deviant behavior (illegal drugs)	.00	1.00	.16	.37	.00	1.00	.10	.30	.000
Deviant behavior (legal drugs)	.00	1.00	.55	.50	.00	1.00	.61	.49	.000
Criminal behavior	.00	1.00	.59	.49	.00	1.00	.30	.46	.000
Mutual aggression	.00	1.00	.17	.38	.00	1.00	.12	.32	.000
Perception of physical and social disorder	.00	17.00	7.99	4.50	.00	17.00	7.36	4.22	.000
Criminal embeddedness	.00	2.00	.51	.65	.00	2.00	.43	.63	.000

Source: Social losses caused by violence: violence in schools (2005, CRISP/UFMG).

Figures **1**, **2**, **3**, and **4** partially answer the first hypothesis of our study concerning the effect of criminal involvement, represented by the measure of criminal embeddedness in the students' school and "deviant" field. As can be seen below, the measure of criminal embeddedness is inversely related to the level of school satisfaction—that is, the more intense the involvement with relatives and friends who have been arrested, the lower the level of the student's interest in and satisfaction with the school. On the other hand, there is a direct relation regarding the association between this same measure of criminal embeddedness with the reports of criminal and delinquent behavior for either licit or illicit drugs.

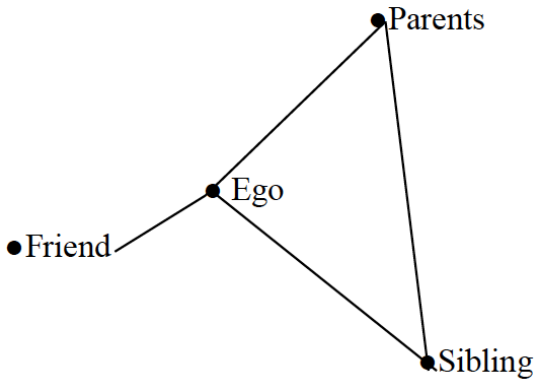

Figure 1: Criminal ego network - The Ego knows the delinquent behavior of the Alters.

The linear regression model enables assessment of the association between crime embeddedness and school satisfaction when controlled by other determinants such as sociodemographic variables of students, previous history of mutual aggression between student and teacher, and perception of social and physical disorder, besides the variables inherent in students such as gender, race, and age. As can be seen, the criminal embeddedness variable, which indicates the student's deviant behavior, has a negative and statistically significant association with the student's level of school satisfaction. This indicates that a greater involvement in a deviant "network" reduces the student's satisfaction with the school environment. The results for the variables associated with mutual aggression and perception of disorder can be interpreted in this same direction. School satisfaction was higher among young students, and the variable indicating the students' gender and socioeconomic status did not present a statistically significant coefficient lower than 5% (model 2, Table **2**) when

Table 2: Effect of Embeddedness on School Satisfaction

	Model 1*							Model 2**						
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF	B	Std. Error	Beta			Tolerance	VIF
Constant	25.647	.743		34.529	.000			25.539	.769		33.196	.000		
Sex (female =1)	.668	.232	.048	2.875	.004	.982	1.018	.644	.239	.046	2.693	.007	.979	1.021
Race (whites = 1)	.654	.251	.044	2.610	.009	.948	1.054	.418	.258	.029	1.622	.105	.937	1.067
Age	-.251	.051	-.083	-4.912	.000	.950	1.053	-.219	.053	-.073	-4.134	.000	.936	1.068
Socioeconomic status	-.294	.118	-.042	-2.489	.013	.941	1.063	-.218	.122	-.031	-1.778	.076	.936	1.068
Mutual aggression	-2.487	.336	-.126	-7.412	.000	.949	1.054	-2.429	.346	-.124	-7.031	.000	.936	1.068
Perception of disorder	-.333	.028	-.208	-11.955	.000	.908	1.101	-.321	.029	-.201	-10.979	.000	.874	1.145
Criminal embeddedness	--	--	--	--	--	--	--	-.691	.195	-.064	-3.540	.000	.901	1.110

*R Square = 0.093, **R Square = 0.099.
Source: Social losses caused by violence: violence in schools (2005, CRISP/UFMG).

Table 3: Estimated Effects of Logistic Regression for Deviant Behavior – Licit Drugs

	Model 1						Model 2					
	B	S.E.	Wald	df	Sig.	Exp(B)	B	S.E.	Wald	df	Sig.	Exp(B)
Constant	-4.187	.321	170.065	1	.000	.015	-3.992	.335	142.197	1	.000	.018
Sex (female =1)	.418	.079	27.745	1	.000	1.519	.447	.083	28.881	1	.000	1.564
Race (whites = 1)	.031	.085	.134	1	.715	1.032	.082	.089	.853	1	.356	1.086
Age	.306	.020	240.533	1	.000	1.359	.282	.020	190.903	1	.000	1.326
Socioeconomic status	.221	.041	28.489	1	.000	1.247	.247	.044	32.213	1	.000	1.281
Mutual aggression	.859	.127	45.444	1	.000	2.361	.874	.137	40.847	1	.000	2.396
Perception of disorder	.064	.010	41.856	1	.000	1.066	.045	.010	18.724	1	.000	1.046
School satisfaction	-.033	.006	30.964	1	.000	.967	-.031	.006	24.265	1	.000	.970
Criminal embeddedness							.613	.072	72.175	1	.000	1.845

Source: Social losses caused by violence: violence in schools (2005, CRISP/UFMG).

controlled by the criminal embeddedness variable. It is important to highlight the behavior of the race variable in the two previous models. In the first model, without the inclusion of the variable indicating criminal embeddedness, race appears as a statistically significant variable, whose result leads to the interpretation that school satisfaction is higher among students who declared themselves white. Nevertheless, once the crime embeddedness variable is introduced in the model as control, race loses the statistical effect initially observed with respect to school satisfaction.

In this study, delinquent and criminal behavior is considered a risk factor—that is, the behavioral attitudes of students in this field of deviance is deemed likely to occur. This is the typical case seen in epidemiological surveys in which the question to be answered aims to establish the relationship between one or more variables and the "disease," which is the effect. To that end, logistic regression models allow us to estimate the probability of the factor materializing, knowing how the exposure associated with independent variables occurs.

Table **3** show the results of logistic models for delinquent behavior associated with both licit and illicit substances respectively. This division between types of behavior is fundamentally due to students' access to the type of substances and, above all, to a type of normative embarrassment exercised by family members and friends more directly involved in the student's social network. Licit substances like cigarettes and alcoholic beverages may not cause embarrassment to users because they are socially accepted and even shared and commonly used among members of social proximity structures.

Using model 2 as reference, where all variables were included, the data allow us to affirm, all other things being equal, that criminal embeddedness increases by 84.5.

The results of Table **4** enable verification of the risk effect associated with criminal embeddedness, which is a variable that describes, in part, criminal behavior in the realm of this study. As shown in the results of model 2, criminal embeddedness increases the chances of using illicit drugs by 125.6.

Table **5** shows the results of the logistic regression model for the dependent variable indicating the risk of the student engaging in some sort of criminal behavior. As can be observed, girls are considerably less likely than boys to engage in this type of behavior, as are students with a higher level of school satisfaction– approximately 72. Again, an interesting and prominent result in this study concerns the behavior of the race variable in relation to criminal behavior, before and after the inclusion of the variable indicating criminal embeddedness. In the first case, model 5a, its effect is statistically significant and indicates that individuals

Table 4: Estimated Effects of Logistic Regression for Deviant Behavior - Illicit Drugs

	Model 1						Model 2					
	B	S.E.	Wald	df	Sig.	Exp(B)	B	S.E.	Wald	df	Sig.	Exp(B)
Constant	-5.051	.415	148.154	1	.000	.006	-5.087	.436	136.406	1	.000	.006
Sex (female =1)	-.426	.112	14.417	1	.000	.653	-.377	.117	10.435	1	.001	.686
Race (whites = 1)	-.115	.121	.905	1	.341	.891	-.038	.127	.090	1	.765	.963
Age	.229	.024	93.046	1	.000	1.257	.205	.025	68.556	1	.000	1.228
Socioeconomic status	.296	.052	32.485	1	.000	1.344	.321	.055	34.230	1	.000	1.379
Mutual aggression	.777	.134	33.641	1	.000	2.176	.704	.139	25.701	1	.000	2.021
Perception of disorder	.027	.013	3.914	1	.048	1.027	.002	.014	.025	1	.875	1.002
School satisfaction	-.022	.008	7.099	1	.008	.978	-.019	.009	4.601	1	.032	.982
Criminal embeddedness							.814	.084	93.305	1	.000	2.256

Source: Social losses caused by violence: violence in schools (2005, CRISP/UFMG).

Table 5: Estimated Effects of Logistic Regression for Criminal Behavior

	Model 1						Model 2					
	B	S.E.	Wald	df	Sig.	Exp(B)	B	S.E.	Wald	df	Sig.	Exp(B)
Constant	2.421	0.304	63.380	1	.000	11.253	2.782	.327	72.737	1	.000	16.150
Sex (female =1)	-1.210	.078	240.609	1	.000	.298	-1.270	.083	233.111	1	.000	.281
Race (whites = 1)	-.190	.085	4.994	1	.025	.827	-.133	.090	2.171	1	.141	.876
Age	-.143	.018	61.095	1	.000	.866	-.194	.020	94.313	1	.000	.824
Socioeconomic status	.069	.040	2.971	1	.085	1.072	.085	.043	3.940	1	.047	1.098
Mutual aggression	1.236	.119	108.060	1	.000	3.443	1.191	.126	89.581	1	.000	3.291
Perception of disorder	.068	.010	49.386	1	.000	1.070	.056	.010	29.336	1	.000	1.058
School satisfaction	-.034	.006	32.493	1	.000	.967	-.028	.006	20.098	1	.000	.972
Criminal embeddedness							.779	.069	126.528	1	.000	2.180

Source: Social losses caused by violence: violence in schools (2005, CRISP/UFMG).

who identify as white are approximately 28% less likely to report involvement with criminal behavior. An analysis restricted only to this result corroborated criminological studies with similar results. In diverse international contexts, and particularly in Brazil, the proportion of non-whites involved in crimes—both as perpetrators and victims—is higher. Nevertheless, the result found here, despite not being the main focus of the study, should reignite the debate about the effect of race on crime mediated by exogenous factors which, as in this case, have an extremely robust effect. In other words, this finding makes an intervention in the discourse of race in criminology studies.

Figure **3** show the probabilities estimated for the three types of deviant behavior as a function of the

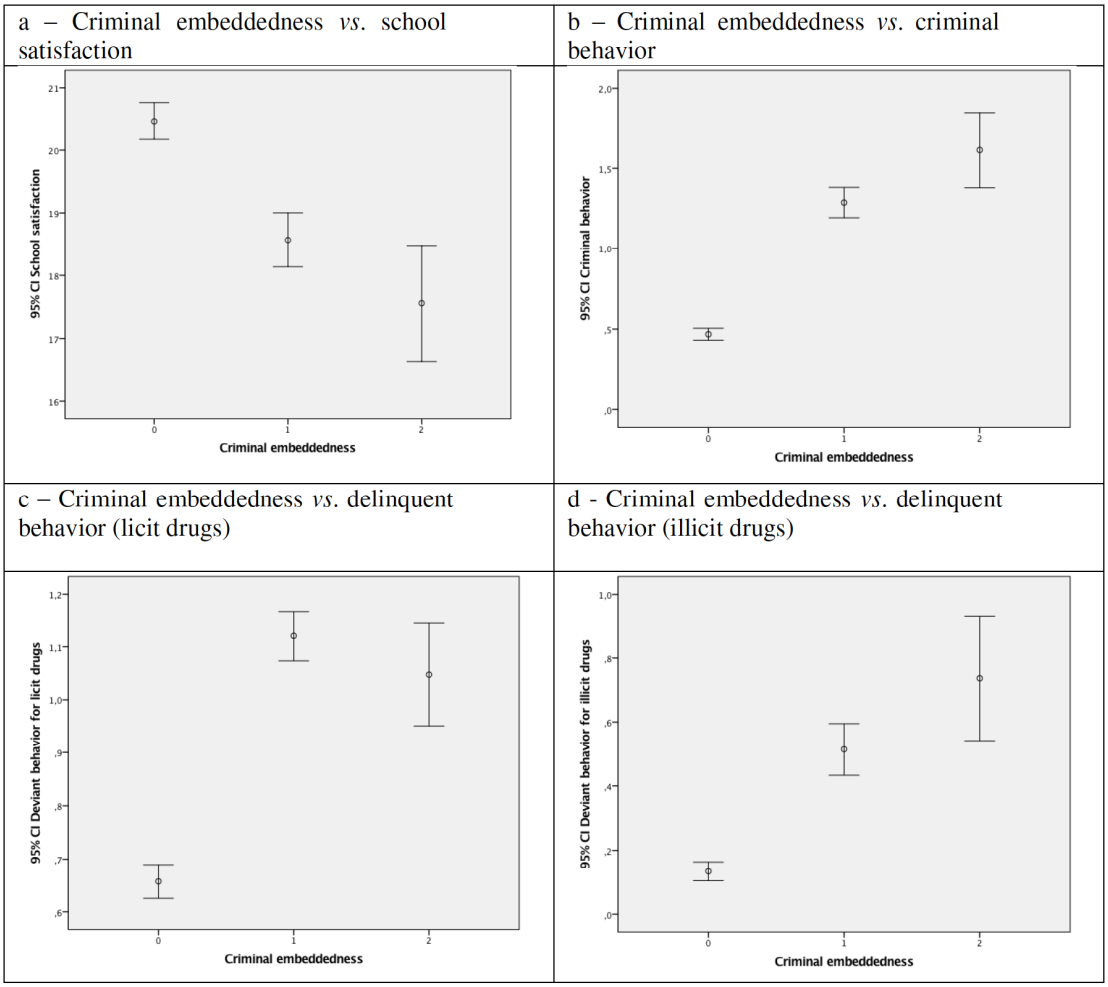

Figure 2: Bivariate effects of the measure of criminal embeddedness on the level of school satisfaction and criminal and delinquent behavior (licit and illicit drugs).

level of criminal embeddedness, distinguishing between gender and race groups. For boys, delinquent behavior related to the use of licit drugs and criminal behavior presents very similar predicted probabilities as criminal embeddedness becomes stronger, varying by 40% and 46% respectively. For this same group, the percentage variation in predicted probability related to delinquent behavior for illicit drugs was almost 160% between the extremes of criminal embeddedness. For girls, the main difference concerns the high values related to predict probabilities for delinquent behavior associated with licit drugs. In this case, the percentage variation was approximately 30%, going from a probability of 0.65 in the case of girls with no criminal embeddedness (equal to 0) to a probability of 84% in the case of the group with greater criminal embeddedness (equal to 2). The predicted probabilities for illicit drug use among women varied from 0.08 to 0.24, an increase of almost 190%. For criminal behavior, this variation exceeded 100%.

Gender, Criminal Embeddedness, and Deviant Behavior

When seeking to analyze the relationship between gender and interpersonal relationship or friendship, most studies present similarities among adolescents, regardless of sex, with respect to the value assigned to trust in the context of friendship. However, the same studies highlight certain gender differences: male adolescents tend to have more dispersed friendship networks focused on common activities, while girls tend to have smaller networks with fewer friends deemed very important (Benenson, 1990). According to Brown (2003), there is a greater prevalence of social control in friendship between girls, so that delinquent behavior tends to be more likely among boys. On the other hand, girls may be more influenced by the behavior of their friends (either boys or girls), since their friendship is characterized by stronger emotional involvement, in which the discussion of personal intimate problems is common (Rose and Rudolph, 2006, Zimmerman *et al*.

Table 6: Impact of Embeddedness on Delinquent and Criminal Behavior – Comparison between Boys and Girls

	Criminal embeddedness			
	Yes		No	
	Boys	Girls	Boys	Girls
Delinquent behavior (licit drugs)	0.663	0.755	0.574	0.672
Delinquent behavior (illicit drugs)	0.182	0.132	0.139	0.095
Criminal Behavior	0.696	0.391	0.598	0.307

Source: Social losses caused by violence: violence in schools (2005, CRISP/UFMG).

Table 7: Logistic Model with Interaction between Sex and Embeddedness

	B	S.E.	Wald	df	Sig.	Exp(B)
Constant	2.827	.328	74.279	1	.000	16.897
Sex (female =1)	-1.371	.104	174.086	1	.000	.254
Race (whites = 1)	-.137	.090	2.316	1	.128	.872
Age	-.194	.020	94.357	1	.000	.824
Socioeconomic status	.086	.043	3.998	1	.046	1.090
Mutual aggression	1.193	.126	89.809	1	.000	3.296
Perception of disorder	.057	.010	29.997	1	.000	1.059
School satisfaction	-.028	.006	20.037	1	.000	.972
Criminal embeddedness	.659	.100	43.918	1	.000	1.934
criminal embeddedness	.216	.132	2.704	1	.100	1.241

Source: Social losses caused by violence: violence in schools (2005, CRISP/UFMG).

Messner 2010). Thus, if girls are more emotionally involved with their friends than boys, the participation of friends in conformist or delinquent behaviors may be especially important in explaining these girls' involvement in delinquency (Hayne, *et al.,* 2014).

This higher degree of cohesion that tends to characterize friendship among female students can be seen as a reflection of the relationship established with their relatives. That is, what will characterize the behavior of girls, compared to boys, is a greater recognition of the norms prevailing among family and friends. Thus, in our view, criminal embeddedness will have a differentiated effect among the distinct group of students in this sample, affecting in a more deleterious way the social behavior of girls, despite the fact that proportionally boys tend to engage more in delinquency and crime, as shown in the following table.

The two variables, gender and criminal embeddedness, were statistically significant for the outcomes considered in the risk models[6]: delinquent behavior for licit and illicit drugs and criminal behavior. Compared to boys, the female students interviewed are more likely to engage only in delinquent behavior associated with licit drugs (cigarettes and alcohol). Delinquent involvement (or criminal networks) measured through the embeddedness variable presented similar statistical results, thus significantly increasing the probabilities of risk.

However, what this paper seeks to focus on is the fact that involvement in a delinquency network, as operationalized here through the criminal embeddedness variable, has a much greater effect on girls than on boys. This situation corroborates the studies that point to the fact that this is the result of a more intimate and emotional investment in friendship among girls. To test this hypothesis, a logistic model whose response variable is the indicator of criminal behavior was implemented and the interaction effect between gender (female = 1) and criminal embeddedness was introduced. The result indicates that the coefficient indicative of criminal embeddedness among girls is positive and particularly significant ($b = 0.216$, $p < 0.10$), providing some evidence that women are 24.1% more likely than men to engage in criminal

[6]We refer here to logistic regression models whose estimated coefficient is treated as a probability of occurrence in relation to non-occurrence.

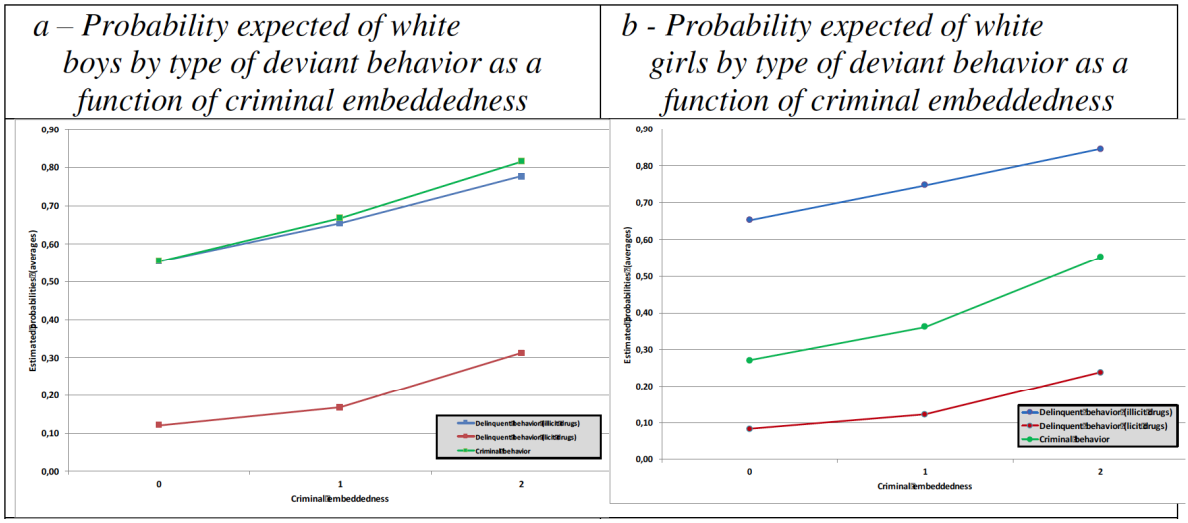

Figure 3: Comparison between delinquent and criminal behavior under the condition of criminal embeddedness.

Source: Social losses caused by violence: violence in schools (2005, CRISP/UFMG).

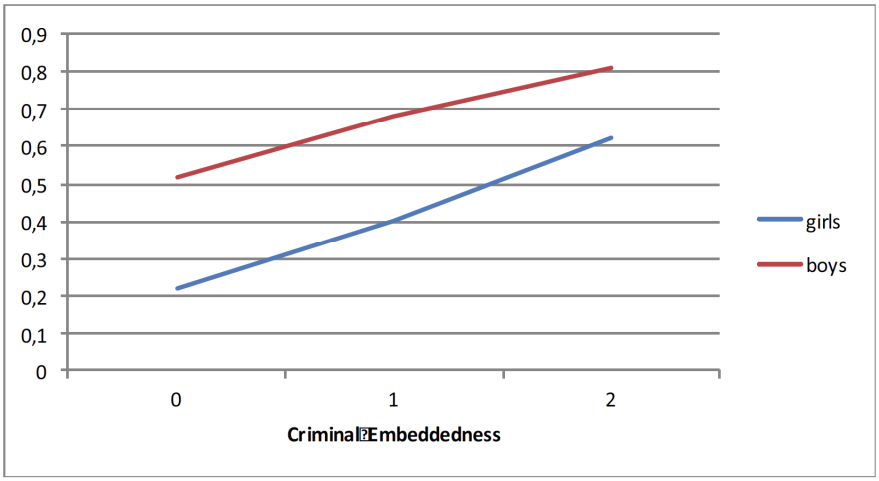

Figure 4: Percentage variations for boys and girls as a function of the level of criminal embeddedness.

Source: Social losses caused by violence: violence in schools (2005, CRISP/UFMG).

behavior when involved in a delinquency network of friendship or kinship.

Based on this last model, we again calculated the specific sex and criminal embeddedness probabilities estimated for criminal behavior. The estimated probability for white boys[7] with no involvement in a network characterized by criminal embeddedness is 0.52 and reached a 0.81 at the maximum level of embeddedness (equal to 2). For girls, although the probability was not as high at this same level of embeddedness, the percentage variation was 40%, going from 0.22 to 0.62. For boys, this variation was 30%. The figure below shows the behavior of these estimated probabilities for these groups of students.

CONCLUSIONS AND NEW RESEARCH HORIZONS

In this study we seek to explore the relational mechanism between social influence and individual behavior, mediated by the intensity of criminal involvement, represented here by the concept of criminal embeddedness. In theoretical terms, this measure represents the context of greater exposure to definitions favorable to crime (Sutherland, 1947), as well as a higher prevalence of differential reinforcements that affect the behavior of individuals in the long run, leading them to a criminal trajectory (Akers, 1988).

[7]Considering that all other covariates of the model were calculated using the sample mean.

Therefore, we consider that the concept of embeddedness to be theoretically fecund in its application to the field of criminology. Empirically, the data and analyses in this study highlight the heuristic value of relational structures (networks), or nearby causes, in the propensity to commit crimes and in the decrease in school satisfaction. In this latter point, we are aware that there may be an untested circularity, insofar as the quality of the school and the school environment can foster attitudes and practices associated with crime. That is, poor-quality schools located in neighborhoods with high crime rates usually attract and select students with poor performance and low school motivation. New studies will enable controlling the hypothesis of embeddedness based on ecological, intra-school and extra-school factors. In addition to the previous hypotheses, our analyses have enabled us to identify how embeddedness separates any association between race and propensity for criminal behavior. When our key variable was included in statistical models, race no longer presented significant statistical associations with behaviors defined as criminal in our study (theft, robbery, possession of firearms and of weapons other than firearms, attacks on classmates, militancy, and gang fights).

The results obtained demonstrate the two hypotheses of the present study:

- Intense criminal embeddedness, in the sense of strong ties, negatively affects school satisfaction.
- Intense criminal embeddedness increases the probabilities of deviant and criminal behavior.

In both cases, the learning process of criminal and deviant behavior is consolidated through differential association in the context of interaction with others who have committed crimes, probably acting actively to provide greater chances of favorable definitions for it, as well as supporting the behavior of others, reinforcing this behavior.

This finding contributes to dismantling prejudices that associate crime with ascribed factors such as race. We also found evidence that converges with studies distinguishing between the relational patterns of women and men in the world of crime. We found that girls were more likely to use licit drugs, but the most relevant was the finding that they had a higher relative gain than boys when they were embedded in a delinquency network. The result shows that once inserted in an intensely criminal relational environment, girls accelerate their process of engaging in deviant attitudes and behaviors. Finally, we draw attention to the fact that studies on criminal behavior have achieved considerable explanatory progress through the contributions of life-course criminology in recent years (Sampson and Laub 1993, Thornberry and Krohn, 2001). These studies propose to explain the factors that influence the acquisition, continuation and cessation of delinquent behaviors in the life course of individuals. In this article we do not propose to address this theoretical approach, yet we nevertheless believe in the existence of a certain connection; one of the assumptions of life-course criminology is that juvenile delinquency is dependent on the development of the biographical and institutional trajectory of individuals in the course of their lives, such as family and school ties, as well as on risk factors such as contact with the criminal justice system. It is precisely through the influence of the biographical trajectory (as related to family and friends and the individual's contact with the criminal justice system) that we point to criminal embeddedness as a decisive factor influencing criminal behavior.

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