

Determinants of crime control in public security policy management

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The topic related to public security in Brazil is central in discussions regarding crime rates. This study approaches the theme from the economic theory of rational choice and sociological theories that seek to explain the causes of crime. The study's objective was to identify determining factors for controlling crime rates based on data from the state of Espírito Santo. This is a study with a quantitative approach. Secondary data were used, based on the proposed theoretical model. The linear regression model was also adopted as a hypothesis testing method, with the aid of the SPSS Statistics software version 25. The results show that the element related to the population's employability directly and significantly influences the control of crime rates, intentional homicides, and crimes against property. Furthermore, combined with employment (formal labor activities), the population's income and education positively influence the control of crimes against property.

Keywords: determining factors; control of crime; willful murders; crimes against property; public security.

Fatores determinantes do controle da criminalidade em gestão de políticas de segurança pública

É alvo central de discussões a temática relacionada à segurança pública no país, especialmente, no tocante aos índices de criminalidade. Este estudo aborda a temática a partir da Teoria Econômica da Escolha Racional e de teorias de base sociológica que buscam explicar as causas do crime. O objetivo do estudo foi identificar fatores determinantes para o controle dos índices de criminalidade a partir de dados do estado do Espírito Santo. Trata-se de um estudo de abordagem quantitativa. Foram utilizados dados secundários, tendo como referência o modelo teórico proposto. Adotou-se, ainda, como método de teste de hipóteses, o modelo de regressão linear, com o auxílio do *software* SPSS *Statistics*, versão 25. Os resultados da pesquisa demonstram que o elemento relativo à empregabilidade da população influencia direta e significativamente o controle dos índices de crimes de homicídios dolosos e de crimes contra o patrimônio. Ademais, conjugado ao emprego (atividades laborais formais), os fatores renda e educação da população demonstraram influenciar positivamente no controle dos crimes contra o patrimônio.

Palavras-chave: fatores determinantes; controle da criminalidade; homicídios dolosos; crimes contra o patrimônio; segurança pública.

Determinantes del control de la criminalidad en la gestión de políticas de seguridad pública

La temática relacionada con la seguridad pública en el país es objeto central de discusión, especialmente con respecto a los índices de criminalidad. Este estudio aborda el tema a partir de la teoría económica de la elección racional y las teorías sociológicas que buscan explicar las causas del delito. El objetivo del estudio fue identificar los factores determinantes para el control de los índices de criminalidad con base en datos del estado de Espírito Santo. Este es un estudio con un enfoque cuantitativo. Se utilizaron datos secundarios, basados en el modelo teórico propuesto. El modelo de regresión lineal también se adoptó como método de prueba de hipótesis, con la ayuda del *software* SPSS *Statistics* versión 25. Los resultados de la investigación muestran que el elemento relacionado con la empleabilidad de la población influye directa y significativamente en el control de los índices de homicídios dolosos y delitos contra la propiedad. Además, combinado con el empleo (actividades laborales formales), los factores ingresos y educación de la población han demostrado tener una influencia positiva en el control de los delitos contra la propiedad.

Palabras clave: factores determinantes; control de la criminalidad; homicídios dolosos; delitos contra la propiedad; seguridad pública.

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1. INTRODUCTION

The theme related to violence and crime in the country, including events that have had national repercussions involving murders, deaths resulting from robberies, robberies and other crimes, are constantly targets for political, academic, media, and society discussions. According to a technical study performed and released in 2018 by the Brazilian Forum on Public Safety (FBSP), in 2017 Brazil registered 63,880 intentional violent deaths (deaths resulting from intentional homicides, robberies, bodily injuries resulting in death, and confrontations with police officers), which is equivalent to 175 deaths per day.

The rate of intentional homicides for each group of 100 thousand inhabitants – an index typically used to compare crime levels between geographic units –, in the country in 2017 was 30.8%, which equals an increase of about 3% when compared to the index registered in 2016 (FBSP, 2018). Brazil constitutes around 14% of the world's homicides and, because of this statistic, the country is included among the 10% of the countries in the world that have the largest homicide rates (General Secretariat of the Presidency of the Republic [SGPR], 2018). The homicide rate in Brazil is similar to the rates reported in African countries, such as Rwanda, South Africa and the Democratic Republic of Congo (SGPR, 2018).

When it comes to the economic costs of violence in Brazil, the rates are even more alarming. In 2017, financing the national security policy reached 84.7 billion, which denotes that the country spent R\$ 408.13 per Brazilian citizen on public security (FBSP, 2018). It was observed that between 1996 and 2015, there was an increase in public security spending, rising from 32 billion to 90 billion reais spent per year (SGPR, 2018). Public security expenditures are not proportionally incurred between the federal spheres (Afonso, 2017; SGPR, 2018; FBSP, 2018). Of the total spent on security between 1996 and 2015, about 19% was equivalent to Union spending, while the participation of municipalities only reached 6% of spending (SGPR, 2018). In 2017, the Union spent 9.7 billion on public security, while states and municipalities spent 69.8 billion and 5.1 billion, respectively (FBSP, 2018).

Among the most diverse discussions related to crime, there are complex aspects and challenges to be pursued by national policy (in all its political and administrative spheres) and by public bodies responsible for security. The assignment of the bodies responsible for public security is not an easy mission: the preservation of public order and the safety of people and property (Constituição [da] República Federativa do Brasil, 1988).

The effectiveness of public security policy may not only be linked to the indiscriminate increase in the volume of spending on the sector, but also to the application of medium and long term effective and impactful actions. Thus, scientific research that highlights which factors (structural, economic, and social) are decisive for the control of crime is highlighted in this perspective. Additionally, the scientific community that investigates the country's public security area advocates for the expansion of studies based on empirical evidence (Afonso, 2017).

Two main approaches can be cited regarding the theme of criminality for the purposes of this research. The first is the Economic Theory of Rational Choice (Becker, 1968; Ehrlich, 1973), which is dedicated to explaining criminal behavior as a conscious choice of the individual, who opts (or not) for crime after evaluating the costs of criminal practice and its benefits. The second approach, of a sociological nature, encompasses a set of theories, which are: the Differential Association Theory (Sutherland, 1973), the Social Control Theory (Agnew, 1991), and the Social Disorganization Theory (Shaw & MacKay, 1942). Each sociological theory has particularities; however, they all argue that criminal behavior derives from the context and situations of social life.

Faced with a series of developed works with different results, detailed in the theoretical reference basis below, the purpose of this study is motivated by the expectation of contributing to the identification and analysis of determining factors for the control of crime rates. To achieve this, it started with conducting a study using the hypothetical-deductive method and the quantitative approach. Based on the two criminological approaches listed in this introduction, the article seeks to answer the following research problem: *What are the determining factors for controlling crime rates in the state of Espírito Santo?*

The theoretical contribution of the study is to advance academic research with an emphasis on the identification of key factors related to the circumstances of the crime, having as theoretical bases two different frameworks applied to Public Administration and, more specifically, to the area of public security: the Economic Theory of Rational Choice and the set of sociological theories formed by the Theory of Differential Association, Theory of Social Control, and Theory of Social Disorganization. The development of studies, in this perspective, has the potential to add to the social discussions on evidence and, notably, to subsidize policies in the area of public security and organizational management of the sector, through empirical data that identify the factors surrounding the circumstances of the crime.

The interest in researching Espírito Santo gives greater relevance to the proposal since public security in that state represents an area of critical and sensitive government. In the national ranking of the intentional homicides rate, Espírito Santo ranked second for six consecutive years (2007-2012), in 2009 reaching 56.9 homicides per 100 thousand inhabitants (the highest homicide rate in the historical series, more than double the country's average rate that year) (Institute of Applied Economic Research [IPEA], 2018). According to IPEA, as of 2010, the state began to exhibit consecutive reductions in the intentional homicides rate and in 2016, achieved the seventh consecutive year of reduction in homicide rates. Also according to IPEA, when comparing the homicide rates in the state between 2009 and 2016, there was a considerable reduction of 44%.

That said, in the sequence, we present the theoretical foundation that supported the development of the hypotheses. In the third section, the aspects of the methodological path are presented and, in the fourth, the presentation of the data and the discussion of the results. Finally, there is the conclusion section, where the implications of the study's findings, its limitations and the proposal of questions that will guide future research possibilities are described.

2. THEORETICAL FOUNDATION

Public Security is complex; as a result there are many solutions that aim to help combat violence and the consequences of criminal acts, among which are the guidelines that involve lowering the age of criminal responsibility (Silva & Oliveira, 2015), eliminating firearm possession for the population (Alessi, 2018), the extinction of the progression of the penalty regime (Barbosa, 2017), in addition to the speeches on the expansion of investments around the re-equipment of the police from hiring more civil servants, acquiring armaments, vehicles and other materials. Contrary to solutions based on immediacy and others that work in the post-crime context, the theoretical bases have an essential role in the identification of the criminogenic factors that explain the causes of crimes, whether they are factors at the individual level, such as biological dysfunctions and psychic factors, factors derived from social relations and structural factors of a social, economic, and demographic order (Cerqueira, 2014; Cerqueira & Lobão, 2004; Cerqueira & Moura, 2019; Lima, Santos, Dal'Col & Silva, 2017).

The theoretical bases will play an essential role in this study due to the history of research, the contributory relevance, and the volume of studies. The authors prioritized two approaches, which we will be briefly explain. The first of them, with a classical basis, refers to the Economic Theory of Rational Choice (Becker, 1968; Ehrlich, 1973) which focuses on explaining criminal behavior as a conscious choice of the individual, who makes an assessment of the benefit (rewards) and the costs (risks) of engaging in criminal activity. The second, sociological based, includes a series of theories – which are, Theory of Differential Association, Theory of Social Control, and Theory of Social Disorganization – that explain the phenomenon of crime considering structural and social factors and interpersonal relationships.

Through the lens of the Economic Theory of Rational Choice, the practice of a crime assumes a rational and deliberative capacity of the subjects, who choose to commit a crime guided by the principle of utility (Shon & Barton-Bellessa, 2015). The cause of the crime would thus be related to factors related to income, such as the perceived wage in the formal labor market, unemployment, and income inequality, along with dissuasive factors, such as ineffectiveness of the work of police forces and punishment or impunity in the face of criminal acts (Cerqueira, 2014).

Although this theory has made important contributions to the Social Sciences, it has become prominent in fields, such as Economics, Sociology, Political Science, Psychology, and continues to arouse interest within Criminology theorists who have a particular skepticism regarding it, which concerns the proficiency of generating a general theoretical basis to explain criminal conduct. It is a theory whose gaps are cited by several scholars, according to which, despite the importance of individual differences in rational choice, the knowledge base on the subject is limited (Loughran, Paternoster, Chalfin & Wilson, 2016; Ray, Baker & Caudy, 2020).

For Loughran et al. (2016, p. 86), skepticism about the theory was fueled by its generality because “a theory that emphasizes the rational weighting of the costs and benefits of shares may be perfectly applicable to financial market decisions, but not to criminal behavior”. In addition, if applicable to the crime, it would be limited to explaining criminal acts against property. Thus, this theory alone would be insufficient to explain, in practice, violent crimes or those resulting from actions loaded with strong emotions. Another criticism is that the theory has a limited conceptual scope, by restricting

the debate to the financial costs and gains obtained with the infraction. In this sense, Cerqueira and Moura (2019) express doubts about the association of the theory's arguments about violent crimes, such as homicides, since lethality can be an effect of a premeditated action unrelated to any economic motivation. Sociological criminologists would often be hostile to the theory for its financial logic (Loughran et al., 2016).

In response, Ray et al. (2020) set out to test whether psychopathy moderates the relationship between risks and rewards of self-declared aggressions. For that, they used panel data, collected from a sample of serious juvenile offenders and estimated hybrid models. Until now (2020), no research has been conducted to examine the moderating effect of psychopathy on the perception of risks and rewards in self-reported criminal conduct. The study results can help to fill a gap in the Rational Choice Theory under the extent to which perceptions of risks and rewards are conditioned by individual differences.

In the understanding of this article, in line with the vision of sociological Criminology, to apply aspects of rational choice to empirical literature, it is important to harmonize this perspective with social theories of crime.

Still focusing on the Theory of Rational Choice, it is argued that its classic and contemporary basis has supported the work of Alfred Adler, one of the pioneers in Psychology, to develop a theory capable of explaining criminal conduct (Shon & Barton-Bellessa, 2015). Adler follows the rational choice aspect and further states that variables such as time and space, which influence the opportunities to participate in illegal acts, are important in understanding the phenomenon, in addition to individual differences in subjects with a propensity to criminality based on aspects of crime. Although psychological theories have not been as prevalent as those of a sociological nature and those from the classical perspective, their potential to allow practical theories to Criminology is advanced (Shon & Barton-Bellessa, 2015).

Shon and Barton-Bellessa (2015) clarify that Adler's theoretical path points to premeditated criminal conduct, related to material gains and linked to the lack of social ties, feelings of belonging, and the feeling of unfair treatment by those around him. This perspective is criticized for adopting a limited definition of crime, for – unconsciously – pointing the criminological lens at disadvantaged classes, for being instrumentalist, and for failing to integrate with the political economy of crime in their theoretical efforts, while neglecting the impact of crime, spontaneity in the process, and socioeconomic aspects in the development of personality and crime.

If the forces that connect criminal conduct and state responses to crime disproportionately affect people, it is believed that an analysis dedicated to understanding the determinants of crime control must also incorporate the analysis of structural and exogenous factors to the subject who commits the crime. This makes it necessary to have an interdisciplinarity capable of encompassing different social factors, which the article in question intends to contribute by weaving aspects of crime in the light of different theoretical frameworks and by including in the discussion, in terms of empirical contributions, the effects of socioeconomic elements on the criminal offenses indexes.

To explain criminal behavior, one of the counterpoints to the linearity of rational choice is the sociological approach that is presented here through the following theories: Theory of Differential Association, Theory of Social Control, and Theory of Social Disorganization.

The Differential Association Theory (Sutherland, 1973) argues that criminal behavior originates in the individual's socialization process and the establishment of his social interactions. This perspective leads to the comprehension that just as individuals learn values, attitudes, techniques, they also learn the commission of crimes and non-criminal behavior (Costa & Varalli, 2018; Dobrow, 2015). Although the theory contemplates aspects at the macro level (of the environment, beyond the individual/micro level) insofar as it emphasizes sociological and learning processes (as well as rationalized, criminal behavior is learned), it seems to fail to explain how learning would occur in criminal conduct (Shon & Barton-Belessa, 2015). Its main contribution is to allow reflection on the complexity that involves different types of crime and that the transmission of learning about crime is linked to the interpersonal relationships of individuals (Costa & Varalli, 2018).

The Theory of Social Control (Agnew, 1991) seeks to explain in certain aspects of the social environment, the reasons that lead an individual to commit (or not) criminal acts, such as family relationships and educational activities (Lima et al., 2017). The fundamentals of this theory emphasize an understanding of why individuals conform with social norms. In essence, it is argued that a crime can occur when an individual does not socially isolate. In this sense, this perspective emphasizes that the concept of primary self is built by individuals through close and frequent associations with people in the environment in which they operate. Compliance can manifest itself by accepting rules and regulations, family controls, and neutralization techniques used to justify behavior. From this perspective, communities with more distant ties would be subject to higher levels of crime (Shon & Barton-Belessa, 2015).

Social Disorganization Theory (Shaw & McKay, 1942) is the last explicit theory. Through a systemic view, this theory allows the understanding that social organization can maximize or mitigate social control and, consequently, the practice of crimes, considering, in this aspect, elements such as socioeconomic status, employment status, households, etc. (Cerqueira & Lobão, 2004; Mattos, 2018). Although the focus of the theory's argument is that there is a geographic concentration of crimes in certain locations and neighborhoods (distribution of crime) and that behavioral choices for the practice of crime would be related to the physical (geographic) and social environment of individuals, this perspective helps to realize that crime can be a response or reaction to unfavorable living conditions (Bond, 2015). In this sense, Derziotis (2017) complements that, from the perspective of this theory, the high crime rates in certain locations are not restricted to their geographical location, but also due to their association with relevant social issues, such as unemployment, poverty, low economics, and other income.

To summarize, the first theoretical approach described, the Economic Theory of Rational Choice, leads to the understanding that crime is an action taken by the individual who rationally decides by weighing the benefits (or rewards) and the costs (or risks of an action). Without detailing the limitations invoked by the literature, Rational Choice subsidizes the understanding of a certain linearity of crime, that is, crimes tend to follow a directed logic, considering the balance made by the subjects. The sociological theories of crime problematize the phenomenon of crime from the social circumstances that affect its practice, whether they are founded on the interpersonal relationships of individuals, family and/or educational social control, people's socioeconomic status, and other elements.

In academic production dedicated to investigating factors that determine crime, based on explicit theoretical approaches, there are notable international and national literature researchers performed, which we present below.

Levitt (1997, 2004) developed works to investigate factors responsible for the reduction of crimes in the United States in the 1990s. The economist understood that four factors would explain the reduction of crime in the country, namely: the increase in the number of police officers, the growth of the prison population, the retreat of the crack epidemic, and the legalization of abortion. Bradford (2011), a London researcher, in contrast to Levitt, maintained that the causal effect of the size of the police force on the reduction of violent crimes is weak and, considering the number of police and crimes against property, the relationship has minimal impact.

In an analysis of the period between 1970 and 2005, a specialist in Criminology in the United States, Stemen (2007), produced studies on the impact of incarceration on crime in the country. The author confirmed that more in-depth research shows that the 10% increase in the number of incarcerations generates a reduction of just 4% in crimes. Stemen's work (2007) contributes by mentioning other factors that have a positive impact on the fall in crime rates: the increase in the number of police officers per capita, the reduction in unemployment rates, and the increase in income and education levels.

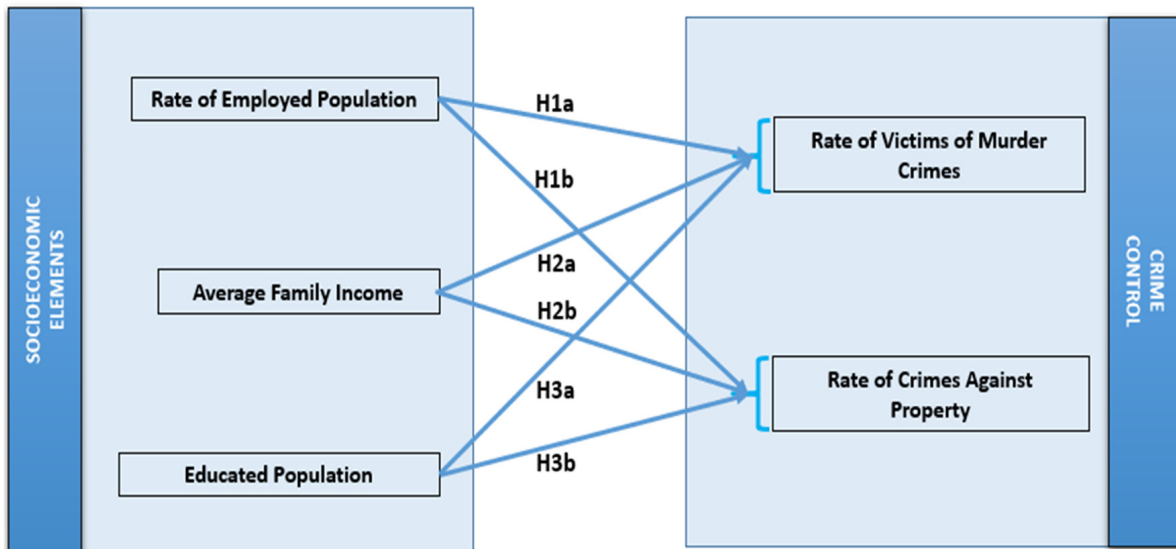
Stemen (2007) notes other authors have addressed the relationship between social aspects and crime rates. Mallubhotla's (2013) empirical study with a quantitative approach proved the positive and statistically significant effect between employment and crime, concluding that the increase in the number of jobs tends to reduce crime rates. Niknami (2012), also through an empirical study, found evidence of the relationship between the population's income levels and the crime rate against property, allowing us to assume that income inequality is strongly related to criminal behavior. Nevertheless, Hjalmarsson and Lochner (2012) considered that policies dedicated to improving education have the potential to act both positively and strategically in reducing crimes.

At the national level, Cerqueira and Moura (2019), through the development of quantitative research, concluded that the reduction of the unemployment rate in the age group 15 to 29 years, as a consequence of the increase in jobs, has the potential to remove young men from criminal activities in the country. Bartz, Quartieri and Menezes (2018), whose study focused on data from the administrative regions of Rio Grande do Sul, identified that variables related to the population's income influences the behavior of criminal indexes. These authors even explain that the increase in income of the poorest population has an impact on the reduction of crimes. In seeking to identify the determinants of crime in the Southeast region of the country, Anjos Júnior, Lombardi Filho and Amaral (2018), reached, according to the results of the quantitative research, the understanding that homicide rates, specifically, are positively influenced by population density, GDP per capita, the unemployment rate, and the proportion of young people in the population.

It can be seen, therefore, from the results of the extracted data of the academic research presented, that there are differences and similarities between the studies, which makes the theme linked to the circumstances of the crime even more relevant. In this context, the present study presents a theoretical model proposed for the testing of theoretical hypotheses, designed from the

theoretical approaches explained. Figure 1 below represents the proposed theoretical model and the research hypotheses – the dimension directly related to the “crime control” construct is called “socioeconomic elements”.

FIGURE 1 PROPOSED THEORETICAL MODEL AND RESEARCH HYPOTHESES



Source: Elaborated by the authors.

The model presents the following relationships: on the left are the three variables that represent the “socioeconomic elements”, being 1. in the employed population; 2. average family income; and 3. education level of the population. These three variables are also known as independent variables (IV) since they theoretically influence the dependent variables. To the right is the “crime control” construct, consisting of the dependent variables (DV): 1. number of victims of intentional homicides, and 2. police occurrences of crimes against property.

The control of crime rates of intentional homicide and crimes against property are considered to be the greatest challenges for managers in the area of public security and are usually used in academic research focusing on the subject. Messner (1982), when studying the relationships between poverty, inequality, and crimes, used homicide crimes as a reference for correlations. When investigating the causality between income inequality and violent crimes, Fajnzylber, Lederman and Loayza (2002), used homicide and robbery rates. Conversely, Levitt (2004), when deepening the analysis on the causes of the decline of crimes in the United States, had as reference the statistics of homicides and crimes of property (robberies and thefts).

2.1 Socioeconomic elements

The dimension called “socioeconomic elements”, comprises independent variables (IV) as the number of the employed population, average family income, and education level of the population. The Economic Theory of Rational Choice (Becker, 1968; Ehrlich, 1973) encompasses the highlighted dimension in view of the fact that it defends the cost-benefit perspective of the conduct of individuals in view of the propensity for criminal activity (Strapazzon & Tramontina, 2015). Campos (2008) explains based on this theoretical approach that variables such as the efficiency of the police apparatus and the justice system and the severity of crime punishments are factors that tend to reduce the propensity for crime. With a similar effect, variables related to income, salary and education are positive factors that tend to keep the individual away from criminal conduct.

Consistently within this logic, it is observed that sociological approaches to crime complement the Economic Theory of Rational Choice in an attempt to relate social aspects to the control of crime.

The Differential Association Theory (Sutherland, 1973), is of interest to the scope of this study by indicating that criminal conduct is the result of group contexts, individual interaction, and communication processes (Cerqueira & Lobão, 2004; Martins & Gomes, 2011). In this aspect, institutions and social networks are responsible for the individual’s primary socialization (such as family, school, neighborhood, etc.) and have a preponderant role for entering (or not) in the world of crime (Costa & Varalli, 2018).

The Theory of Social Control (Agnew, 1991), argues that the greater the level of involvement of the individual with the social system, the greater the alliance of the individual with current values and norms, which, consequently, would remove him from committing crimes (Anjos, Lombardi, Ciríaco & Silva, 2018; Cerqueira & Lobão, 2004).

The Social Disorganization Theory (Shaw & McKay, 1942), argues that crime should be understood through the characteristics of the individual’s social environment, pointing out as aspects of social disorganization that influence the practice of crimes: “unstructured families, high residential mobility, reduced educational and labor market opportunities” (Viapiana, 2006, p. 162).

Therefore, based on that theoretical construction, the research hypotheses are presented with regard to the “socioeconomic elements”:

- **H1a:** The increase in the number of the employed population has a positive influence on the control of intentional homicide crimes;
- **H1b:** The increase in the number of the employed population has a positive influence on the control of crimes against property;
- **H2a:** The increase in the average family income positively influences the control of intentional homicide crimes;
- **H2b:** The increase in the average family income positively influences the control of crimes against property;
- **H3a:** The increase in the education level of the population has a positive influence on the control of intentional homicide crimes; and
- **H3b:** The increase in the education level of the population has a positive influence on the control of crimes against property.

3. METHOD

3.1 Source and data collection

3.1.1 Independent variables

The data collected that refer to the “socioeconomic elements” are composed of the following variables: 1. number of the employed population – occupation (OCCU); 2. average family income (AFI) and; 3. level of education of the population (EDU). Referencing the available national bases that involve the variables proposed to measure such a construct, proxies were defined:

OCCU: Rate of employed population;

AFI: Rate of family wages and other compensations of formal workers; and,

EDU: Population literacy rate.

The OCCU was calculated as follows: number of employed population in a given geographic area divided by the total population of the geographic area, and subsequently multiplied by 100. The source of data for the employed population comes from the Central Register of Enterprises (CEMPRE – Cadastro Central de Empresas) of the Brazilian Institute of Geography and Statistics (IBGE – Instituto Brasileiro de Geografia e Estatística), whose data were extracted from the website of the state agency (open and free access).

The variable relative to the average family income was translated into the proxy “wage rate and other formal workers’ compensation” (AFI). The option for this proxy was due to the easy availability of data access through the website of the state agency (CEMPRE/IBGE) and the annual periodicity of data disclosure on average family income data, whose disclosure of each municipality occurs concurrently with the IBGE Demographic Census. The proxy was calculated as follows: salaries and other compensation (tabulated in thousand reais) in a given geographic area, divided by the total population of the geographic area and subsequently multiplied by 100.

Finally, the “population literacy rate” (EDU) was extracted from access to the IBGE Automatic Recovery System (SIDRA).

The rates of the employed population (OCCU) and wages and other compensation (AFI) were calculated for each of the 78 municipalities in the state of Espírito Santo, distributed for the years 2001 to 2015. The source of population data of the state’s municipalities is also from IBGE. The population’s literacy rate derives from the available municipal data from the Demographic Census (IBGE) of the years 2000 and 2010. For the database formulated for this research, it was considered the years 2001 to 2009, data from the 2000 Census and, from 2010 to 2015, data from the 2010 Census were used.

3.1.2 Dependent variables

The variables used in the survey to measure the “crime control” dimension were: 1. the number of victims of intentional homicides and 2. the number of police occurrences of crimes against property. Considering the accomplishment of academic works similar to the proposed study object, the indicated variables were translated into the following proxies:

HOM: Intentional homicide rate for every 100 thousand inhabitants; and
PROP: Rate of crimes against property for every 100 thousand inhabitants.

The “intentional homicide rate for every 100 thousand inhabitants” (HOM) was calculated using the following system: number of intentional homicide victims (crime committed intentionally) in a given geographical area, divided by the total population of the geographical area, and, subsequently multiplied by 100 thousand (Secretaria da Segurança Pública e Administração Penitenciária, 2016).

With regard to the “crime rate against property for every 100 thousand inhabitants” (PROP), we chose to select the types of crime against property with the highest incidence in Espírito Santo (selection criteria) in the period from 2006 to 2015. They are: 1. theft against a person; 2. theft in public transport; 3. theft in commerce; 4. theft in residence and; 5. vehicle theft. Through accessing the database of registered occurrences of these crimes, the number of occurrences was added to consolidate the “number of occurrences of crimes against property”. This rate was calculated as follows: number of occurrences of crimes against property in a given geographic area divided by the total population of the geographic area and, subsequently, multiplied by 100 thousand (Secretaria da Segurança Pública e Administração Penitenciária, 2016). The rates of intentional homicides and crimes against property were calculated for each of the 78 municipalities in Espírito Santo.

The data relating to the number of victims of intentional homicides and crimes against property are based on Police Occurrence Bulletins (POBss), whose database is managed and made available by the State Secretariat of Public Security and Social Defense of Espírito Santo (SESP – Secretaria da Segurança Pública e Defesa Social).

The population data of the municipalities of the state, necessary for the calculation of the rates, were based on the IBGE, which annually provides population estimates for the municipalities and states. It is also noted that, according to the availability of SESP data, the rates were calculated for the years 2001 to 2015 in the case of intentional homicides and, for the years 2006 to 2015, crimes against property.

3.2 Data analysis technique

In view of the presentation of the proposed theoretical model, the hypotheses of the study, and the explicit variables (proxies) and, to achieve an answer to the research problem, the authors proposed the linear regression model as a data analysis strategy through the statistical treatment of using the SPSS Statistics software, version 25.

According to Field (2009), the essence of regression analysis is the possibility of predicting a result (dependent variable), based on one or more predictor variables (independent variables). That is to say, regression analysis is the method that aims to measure the average change of the dependent variable that is associated with one or more independent variables. In this study, two linear regression analyses are proposed: the first (Test 1), with the homicide rate (HOM) as the dependent variable and; the second (Test 2), with the crime rate against property (PROP) as the dependent variable. Therefore, all hypotheses were tested and the results of which are described in the next section.

4. PRESENTATION OF DATA AND DISCUSSION OF RESULTS

The main aspects of the descriptive statistics of Test 1, conducted from the dependent variable rate of intentional homicides for every 100 thousand inhabitants (HOM) and the three independent variables rate of the employed population (OCCU), rate of wages and other compensations of formal workers (AFI), and population literacy rate (EDU), can be seen in Table 1, which includes the summary of the model, the ANOVA test, the coefficients and the correlation (results extracted from the SPSS software).

TABLE 1 DESCRIPTIVE STATISTICS – TEST 1

MODEL SUMMARY						
Model	R	R ²	Adjusted R ²	Standard error of estimate		
1	0,176 ^a	0,031	0,028	24,98786877		
ANOVA ^a						
Model		Sum of Square	df	Medium Square	Z	Sig.
1	Regression	23178,986	3	7726,329	12,374	0,000
	Residue	728042,921	1166	624,394		
	Total	751221,907	1169			
COEFFICIENTS						
Model		Non standarized coefficients		Standalized coefficients	T	Sig
		B	Standard Error	Beta		
1	(Constant)	16,497	7,304		2,259	0,024
	OCCU	0,472	0,120	0,195	3,932	0,000
	AFI	-0,004	0,005	-0,39	-0,803	0,422
	EDU	0,070	0,090	0,024	0,774	0,439
CORRELATION						
		HOM	OCCU	AFI	EDU	
Pearson's Correlation	HOM	1,000	0,173	0,125	0,085	
	OCCU	0,173	1,000	0,803	0,379	
	AFI	0,125	0,803	1,000	0,319	
	EDU	0,085	0,379	0,319	1,000	

Source: Elaborated by the authors.

The linear regression model of Test 1 is presented by the formula: $HOM = b1OCCU + b2AFI + b3EDU + a$. The evaluation of the results allows for the following discussions.

Initially, we observed that the correlation coefficient R, which indicates the degree of association between the intentional homicide rate (DV) and the set of independent variables (population occupation, wages, and literacy) is .176. Thus, it is possible to infer that the set of determining factors has little influence on homicides.

The coefficient of determination of the variance R^2 corroborates the conclusion about the “weak” explanation of the model, considering its result of 0.031. In this way, it is possible to infer that there is a low correlation between all IVs with the DV.

The coefficients also demonstrated that the non-standardized weights (B) and the standardized weights (Beta) are positive and considerable with respect to the independent variable OCCU (occupation); alternatively, the results are negative in relation to AFI (salaries of the family) and not very significant in relation to EDU (level of education).

Finally, Pearson’s correlation test demonstrated that the dependent variable HOM has a greater positive correlation with the independent variable OCCU (occupation). Inexplicably, there was no negative correlation between homicides and any independent variable. In addition, we identified a considerable degree of correlation between OCCU (occupation) and AFI (average wages) and, to a lesser extent, but also positively, with EDU (level of education).

Next, the highlighted elements of the descriptive statistics of Test 2, performed from the dependent variable crime rate against property for every 100 thousand inhabitants (PROP) and the three independent variables OCCU, AFI and EDU is displayed in Table 2.

TABLE 2 DESCRIPTIVE STATISTICS - TEST 2

MODEL SUMMARY						
Model	R	R ²	Adjusted R ²	Standard error of estimate		
1	0,534 ^a	0,285	0,282	175,8189799		
ANOVA ^a						
Model		Sum of Square	Df	Medium Square	Z	Sig.
1	Regression	9553752,222	3	3184584,074	103,020	0,000
	Residue	23987955,42	776	30912,314		
	Total	33541707,64	779			

Continue

COEFFICIENTS						
Model		Non standardized coefficients		Standalized coefficients	T	Sig
		B	Standard Error	Beta		
		1	(Constant)	-291,961		
	OCCU	4,923	1,185	0,245	4,156	0,000
	AFI	0,164	0,042	0,225	3,910	0,000
	EDU	4,319	0,898	0,159	4,813	0,000
CORRELATION						
		PROP	OCCU	AFI	EDU	
Pearson's Correlation	PROP	1,000	0,500	0,486	0,332	
	OCCU	0,500	1,000	0,849	0,398	
	AFI	0,486	0,849	1,000	0,334	
	EDU	0,332	0,398	0,334	1,000	

Source: Elaborated by the authors.

The linear regression model of Test 2 is represented by the following formula: $PROP = b1OCCU + b2AFI + b3EDU + a$. We present the discussion regarding the data extracted for Test 2 below.

It appears that the correlation coefficient R (.534) is higher than that identified in Test 1 (homicides), which denotes that the set of determining factors (occupation, wages, and literacy) more influence crimes against property (PROP) than intentional homicides (HOM).

The result of the coefficient of determination of the variance R^2 (0.285) is also greater than that observed in Test 1 ($R^2 = .031$), thus, it can be concluded that the model of Test 2 better explains the relationship of the independent variables with the dependent variable PROP. This means that the independent variables (OCCU, AFI and EDU) are good predictors to explain the variation that happens in the behavior of the consequent variable, crimes against property.

Therefore, the coefficients demonstrated that non-standardized weights (B) and standardized weights (Beta) are positive and significant with respect to the independent variable OCCU (occupation) and EDU (literacy). Pearson's correlation substantiated that the PROP variable maintains a more intense positive correlation degree with OCCU (occupation) and AFI (salaries) - even presenting very close values.

As in Test 1, there was no negative correlation between crimes against property and any independent variable. The "weakest" correlation found was between the PROP variable and the EDU (literacy). In addition, the considerable degree of correlation between OCCU (occupation) and AFI (salaries) and, to a lesser extent, but also positively, with EDU, in Test 1 is notable.

The model shows some robust relationships between DV (crimes against property) and IVs, as well as relationships between the independent variables themselves. However, despite the dependent variables HOM and PROP presenting low R² indices, this factor does not invalidate the results found of positive and significant associations between the variables that comprise the research model. In this sense, Hair, Hult and Sarstedt (2014) state that the high R² value indicates higher levels of precision, however, despite this finding, the authors mention that there are no practical rules for establishing acceptable values R² and that factors such as the complexity of the model, the research discipline, or the knowledge area dedicated to the study must be taken into account. Thus, according to the authors, R² values of up to 0.20 are considered high in disciplines that study behavior (Hair et al., 2014, p. 175), as in the present study, which touches behavioral aspects of safety public. Furthermore, in Applied Social Sciences the relationship between variables is already considered as a core of the tests of interactions (Cohen, Cohen, West & Aiken, 2003).

Returning to the theoretical propositions that were feasible to be tested in this study, a brief summary of the results obtained with the hypothesis test is presented in Box 1, based on the observance of the significance levels of the correlations.

BOX 1 CONSOLIDATED RESULTS OF HYPOTHESIS TESTING

THEORETICAL HYPHOTESIS	RESULTS
H1a: The increase in the number of the employed population has a positive influence on the control of intentional homicide crimes.	Supported
H1b: The increase in the number of the employed population has a positive influence on the control of crimes against property.	Supported
H2a: The increase in the average family income has a positive influence on the control of intentional homicide crimes.	Rejected
H2b: The increase in the average family income positively influences the control of crimes against property.	Supported
H3a: The increase in the education level of the population has a positive influence on the control of intentional homicide crimes.	Rejected
H3b: The increase in the education level of the population has a positive influence on the control of crimes against property.	Supported

Source: Elaborated by the authors.

The results showed congruence with the considerations of the approach related to the Economic Theory of Rational Choice (Becker, 1968; Ehrlich, 1973), since the analysis demonstrated that homicide and property crimes are correlated with the *socioeconomic* dimension related to the occupation (employment) of the population. In view of the rational choice of committing crimes, the variable referring to the occupation of the population (employment) becomes a positive factor for the individual (of a preventive character) and discouraging the practice of crimes, as advocated by Scheeffler (2013), Cerqueira and Lobão (2004) and Strapazzon and Tramontina (2015). It is also possible to suppose

that the more employment opportunities there are for the population, the greater the likelihood of control over crimes of intentional homicides and crimes against property.

It is worth mentioning, in this respect, that the correlation coefficient R of Test 2 (crimes against property), being higher than that identified in Test 1 (homicides), translated into a greater influence of the factors “occupation, salary, and literacy” on crimes against property (PROP) than on intentional homicides (HOM), and reiterates the criticism of Loughran et al. (2016) that the Theory of Rational Choice, in a context applicable to crime, would be limited to explaining crimes against property, showing itself insufficient, in itself, to explain in practice violent crimes, such as homicides.

In the case of the regression model test performed with the dependent variable crimes against wealth (Test 2), it appears that, in addition to the positive influence related to “employment”, the independent variable “wages” (or income) was emphasized. This enhances the capillarity of this model’s correlation with the Economic Theory of Rational Choice, with the Theories of Social Control and Social Disorganization. Employed and earning individuals (formal jobs) are considered less likely to commit crimes against property. The Theory of Social Control assists in this understanding since it explains that the greater the involvement of individuals with the social system – employment and income due to formal work and activities in the area of education – the greater the link between these and current values and norms, resulting in a less likelihood to commit crimes (Anjos et al., 2018; Cerqueira & Lobão, 2004).

Following the same reasoning, the conditions of social organization, such as insertion and performance in the labor market, distances the individual from the conduct of criminal practices, an understanding that is substantiated by the Theory of Social Disorganization (Shaw & McKay, 1942). Thus, the analyses of this study converge with the results obtained in other academic researches focused on this phenomenon, such as the works of Stemen (2007), Niknami (2012), Mallubhotla (2013) and Cerqueira and Moura (2019).

5. CONCLUSIONS

To identify the determining factors for the control of crime rates from a sample of the state of Espírito Santo, the results of this research present relevant findings both from a practical (managerial and social) point of view, as well as from its academic relevance.

The research presented a theoretical model based on two theoretical approaches –the Economic Theory of Rational Choice and the set of sociological theories composed of the Theories of Differential Association, Social Control, and Social Disorganization – focusing on the influence of socioeconomic elements on the dependent variable “crime control”.

The quantitative study used the collection of secondary data, obtained through access to databases of state and federal public agencies. There was a limitation in data collection as it is possible to date to obtain data referring only to intentional homicides and crimes against property (dependent variables). Additionally, in relation to the independent variables, data can only be collected on the number of the employed population, the salaries and other compensations of formal workers and the level of literacy of the population (independent variables of the dimension “socioeconomic elements”). Despite the limitations, such factors do not disqualify the research, which, following the recommendations of

the consulted literature, strictly followed the methodological steps, responded to the problem invoked in the study, as well as fulfilled the objective that was proposed.

Given the considerations made and the theoretical approaches evidenced in the textual content of the article, it is possible to affirm, at first, that the confirmation of hypotheses H1a and H1b finds support in the theories: Economic of Rational Choice, Social Control, and Social Disorganization. The research confirmed the argument that employment levels have the potential to act positively on the control of crime (crimes of intentional homicides and crimes against property).

The confirmation of hypothesis H2b, with regard to the positive influence of the average family income on the control of crimes against property, is also consistent with the discussions of the aforementioned theories. Issues related to the population's income and the interactions of individuals with work activities and the formal labor market tend to influence crime rates against property. In fact, the social elements related to *employment* and *income* are crucial points for the prevention of crimes of property nature. Lastly, it is suspected that the possible relationships between the level of education of the population, the process of socialization of the individual, and the propensity to practice property crimes can be better explained in the light of the Theories of Differential Association and Control Social.

Therefore, the research results show that the determining factors for the control of crime rates in the state of Espírito Santo involve, mainly, aspects related to the *employment* of the population.

That said, in theoretical terms, the potential of the study was recognized, through the integration of the different theoretical approaches adopted, to contribute to the understanding that the choice for the practice of crimes finds justifications in the benefit that can be extracted from the act, combined with influences from the social environment and the socioeconomic context to which individuals are subjected. It can be said that the present research managed to harmonize the theories mentioned, converging them into a common and solid point: factors related to the *employment* of the population help to understand the studied phenomenon, that is, the control of crime.

In practical terms, these findings from the study may have implications for better management of Brazilian public security organizations and support technical arguments from public managers regarding the need to direct public resources to implement social policies and actions that potentially impact the public security landscape in the long term. It is noteworthy that multidisciplinary and transversal policies that combine actions of a police nature and social actions, carried out in an integrated manner, can positively influence public security.

In the case of this study, it was clear that social actions must be directed towards generating employment and income for the population, which may include the provision of professional qualification courses, tax incentives for attracting and maintaining companies, and providing lines of credit for micro and small businesses. It should be noted that these considerations apply to the state of Espírito Santo (focus of the study) and to other states that have similar contextual and social characteristics.

Additionally, the development and practical results of academic research such as this, provide for closer interactions between academia and public management, providing secure answers to social issues, as well as supporting the development, construction, and consolidation of the research agenda in this field.

As a possibility for future research, it is recommended that to fill gaps in the Economic Theory of Rational Choice in Criminology – particularly with regard to the extent to which perceptions of risks and rewards are conditioned by differences between individuals – develop research that includes the moderating effect of psychological factors on the perception of risks and rewards in criminal conduct. This should include variable control tests, such as geographic and demographic characteristics, ethnicity, age and gender, in addition to those related to exposure to violence, individual's history and previous involvement of him and his family in crimes.

Finally, further studies are suggested that seek to broaden the theoretical model and the research hypotheses proposed in this article, contemplating, in addition to the dimension “socioeconomic elements”, other dimensions that evidently indicate influencing the control of crime according to the literature, such as: 1. dimension “elements of police activity” (variable as in the case of police, subdivided by the amount referring to each state police) and 2. dimension “elements of the justice system” (variable as in the prison population). To collect these variables, it is necessary to access the official data disaggregated from the state public administration. It is added that with regard to the dimension “socioeconomic elements”, it is suggested to collect data on other variables, such as: basic education development index, average years of study, salaried population, number of jobs created, average income per capita household income, unemployment rate and others, with a view to broadening the understanding about the phenomenon studied within the research field in public security policy management.

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