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An Empirical Analysis of the Relationship among Social Institutions and Juvenile Arrests in Virginia

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A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

by

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Abstract

AN EMPIRICAL ANALYSIS OF THE RELATIONSHIP AMONG SOCIAL INSTITUTIONS AND JUVENILE ARRESTS IN VIRGINIA

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A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

Virginia Commonwealth University, 2017

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The United States has unusually high rates of violence among developed nations, including the victimization of and perpetration by youth. Using Institutional Anomie Theory (IAT) as the theoretical framework, this study analyzes the relationships between social institutions and crime and the interactive relationships among the institutions in a sample of Virginia localities. Multivariate analyses are conducted to produce additive and multiplicative models, and simple slope analyses are conducted to clarify interaction/moderation effects. Findings yield mixed support for IAT. Localities with higher levels of monthly welfare per recipient (a measure of polity) have lower juvenile violent crime arrest rates, and welfare moderates the relationship between income inequality and juvenile violent crime arrests. Controlling for all variables, no

support was found for the direct effects of any other institution on juvenile violent crime arrests. Policy recommendations include maintenance of welfare programs and improvement of work participation supplementary programs.

Chapter 1: Introduction

According to the Heritage Foundation (2017), the United States ranks 17th in the world on the Index of Economic Freedom with high scores in the areas of free market and property rights. While some scholars and politicians have praised and supported these capitalist qualities (Bjørnskov & Paldam, 2012; Levitt, 1983), other theorists question whether these qualities and the general economy are inappropriately placed on a pedestal (Marks, 2012; Rosenfeld & Messner, 1995). Institutional Anomie Theory (IAT) particularly asserts that over-idolization of economic values leads to detrimental results, namely exceptionally high crime rates (Rosenfeld & Messner, 1995).

Reports show that the United States is a top contender for having the highest homicide rates among developed nations (Bureau of Justice Statistics, 2004; Cook & Khmilevska, 2005; European Institute for Crime Prevention and Control, 2010; Grinshteyn & Hemenway, 2016; van Dijk & Kangaspunta, 2000). According to analyses of 2010 World Health Organization data, American youths are at greater risk of being victims of homicide than youths in other high-income nations: 3.4 times more likely for Americans aged five to 14 years old and 14.0 times more likely for Americans aged 15 to 24 (Grinshteyn & Hemenway, 2016). Furthermore, violent victimization by minors in the United States occurs at a greater rate than violent victimization committed by adults (3.5 times greater) (Oudekerk & Morgan, 2016).

Simple observance of the above facts (American pride in its economy and American crime and victimization rates) appear to support IAT. Proving such a relationship is not so simple, however. IAT states that overvaluation of the economy and devaluation of the institutions of education, family, and polity result in a breakdown of social norms (Rosenfeld & Messner, 1995). Theoretically, anomie, the breakdown of social norms, brings forth greater crime rates (Rosenfeld & Messner, 1995). Accordingly, the current study applies IAT to examine the statistical relationships among the economy, noneconomic institutions (polity, family, and education), and Virginia juvenile violent crime arrest rates for a sample of counties and cities in Virginia.

Problem Statement

The decision on how to measure crime (whether to use crimes reported to the police, police service calls, victimization statistics, or arrest rates as a proxy measure) impacts the results yielded and conclusions drawn from statistical analyses (Decker & Kohfeld, 1985; European Institute for Crime Prevention and Control, 2010; Lauritsen, Rezey, & Heimer, 2016). Due to time constraints, lack of publications on rates of juvenile-perpetrated crimes reported to the police, and difficulty in obtaining victimization data, this study utilizes arrest data. Decker and Kohfeld (1985) and Puzzanchera (2013) argue that arrest data are inferior measures of crime because arrests measure police activity or contact with the justice system. Juvenile arrests may underestimate the full extent of juvenile delinquency and criminality. Yet, arrests serve as a good proxy in the case of juveniles, because by the time of arrest, justice officials have determined the perpetrator is likely a juvenile rather than an adult. In consideration of these reasons, the present study will discuss juvenile arrest rates.

National and Virginia Trends

Although crime is a persisting problem in the United States, violent index crimes (defined as aggravated assault, murder/nonnegligent manslaughter, rape, and robbery) has significantly decreased nationwide (Federal Bureau of Investigation, 2016a; Federal Bureau of Investigation, 2016b). According to the National Center for Juvenile Justice (2015), the national juvenile arrest rate for juveniles aged 10 to 17 for violent index crimes was 295.4 per 100,000 population in 1980, peaked in 1994 at 497.4, and declined to almost half of 1980's rate in 2014: 157.8 per 100,000 population (see Figure 1).

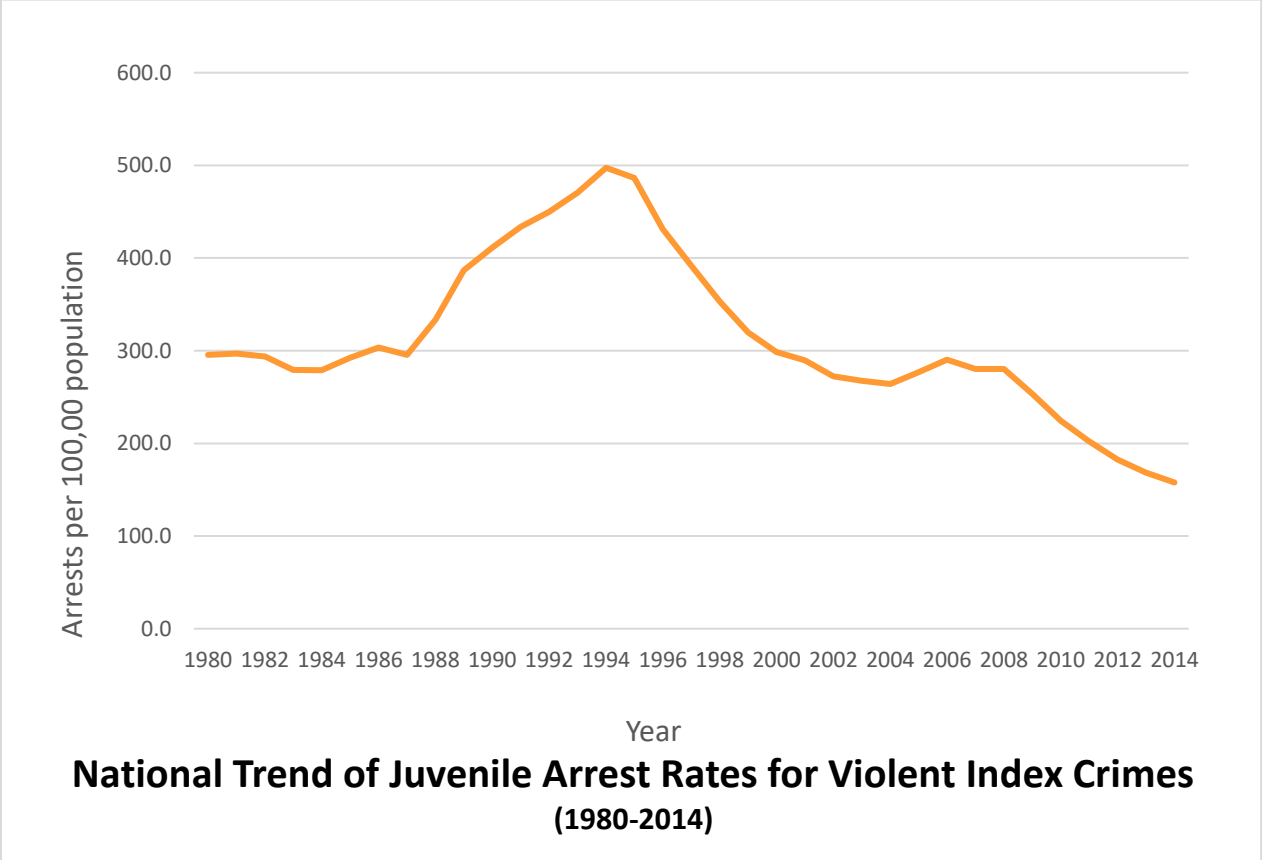

Figure 1
Source: National Center for Juvenile Justice. (2015). [Table of juvenile arrest rates by offense, sex, and race for 1980-2014]. *Law enforcement & juvenile crime: Juvenile arrest rate trends.* Retrieved from https://www.ojjdp.gov/ojstatbb/crime/JAR_Display.asp?ID=qa05201

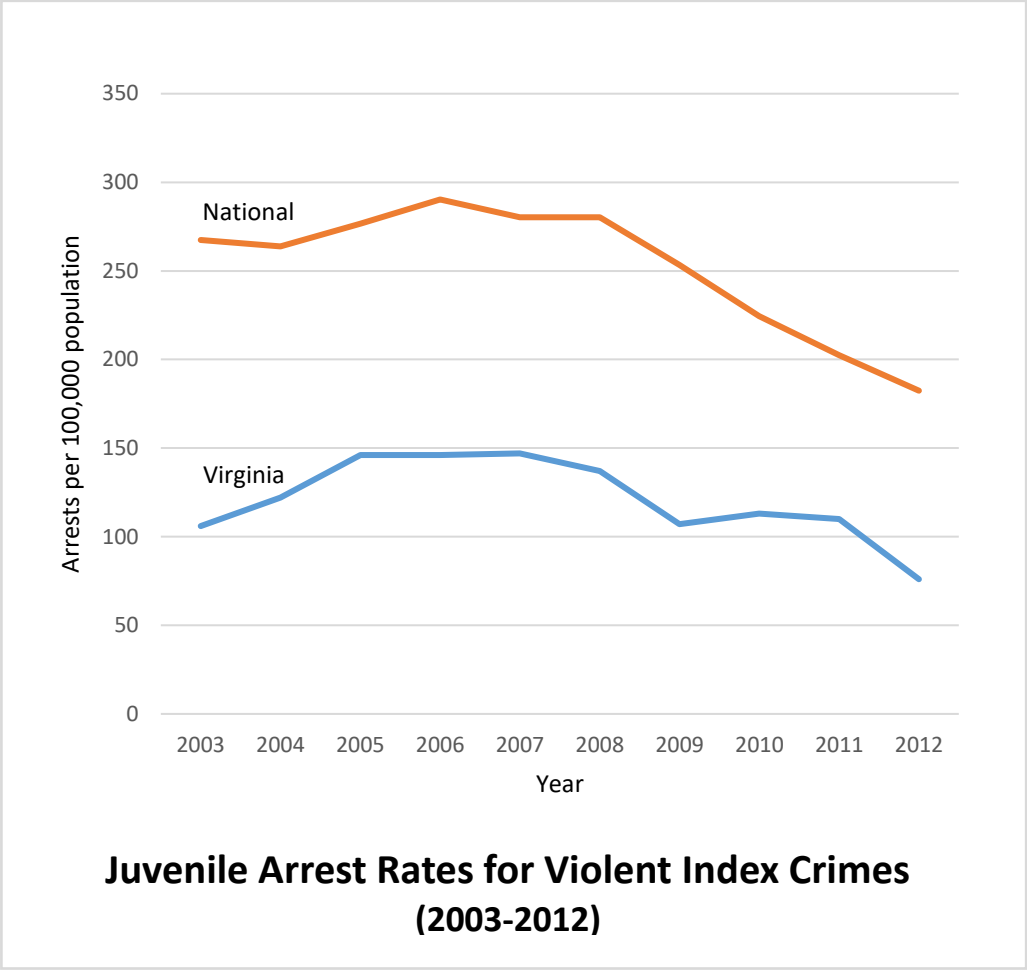

Figure 2
Sources: Council on Virginia's Future. (2016). *Juvenile intakes.* Retrieved from http://vaperforms.virginia.gov/indicators/publicsafety/juvenileIntakes.php

National Center for Juvenile Justice. (2015). [Table of juvenile arrest rates by offense, sex, and race for 1980-2014]. *Law enforcement & juvenile crime: Juvenile arrest rate trends.* Retrieved from https://www.ojjdp.gov/ojstatbb/crime/JAR_Display.asp?ID=qa05201

In Virginia, any person under the age of 18 may be arrested and adjudicated for criminal offenses (National Juvenile Defender Center, 2016). Some cases occur where children under the age of 10 are arrested for simple assault and burglary, for example (Virginia State Police, 2012). Because each state determines its own threshold for the minimum age of criminal responsibility (Child Rights International Network, 2017; National Juvenile Defender Center, 2016; UNICEF, n.d.), policy regarding age applicable for arrest also varies across states. Hence, comparative

national data on juvenile arrests refer to ages 10 to 17. Agencies reporting Virginia juvenile arrest rates also report rates on youth aged 10 to 17. The Virginia State Police, however, publish juvenile arrest counts which include all youth under the age of 18.

Regarding juvenile violent crime arrest rates, Virginia ranked 38 highest of all states in 2010 (National Center for Juvenile Justice, 2014). Virginia's ranking is markedly lower than that of its neighbors Maryland, Tennessee, and Kentucky which rank 2, 4, and 19 respectively (National Center for Juvenile Justice, 2014). The Virginia juvenile violent crime arrest rate of youths aged 10 to 17 was about 150 arrests per 100,000 population in 1986, then peaked at 270 per 100,000 population in 1995 a year after the national arrest rate peaked (Department of Criminal Justice Services, 2016). The arrest rate declined to 76 arrests per 100,000 population in

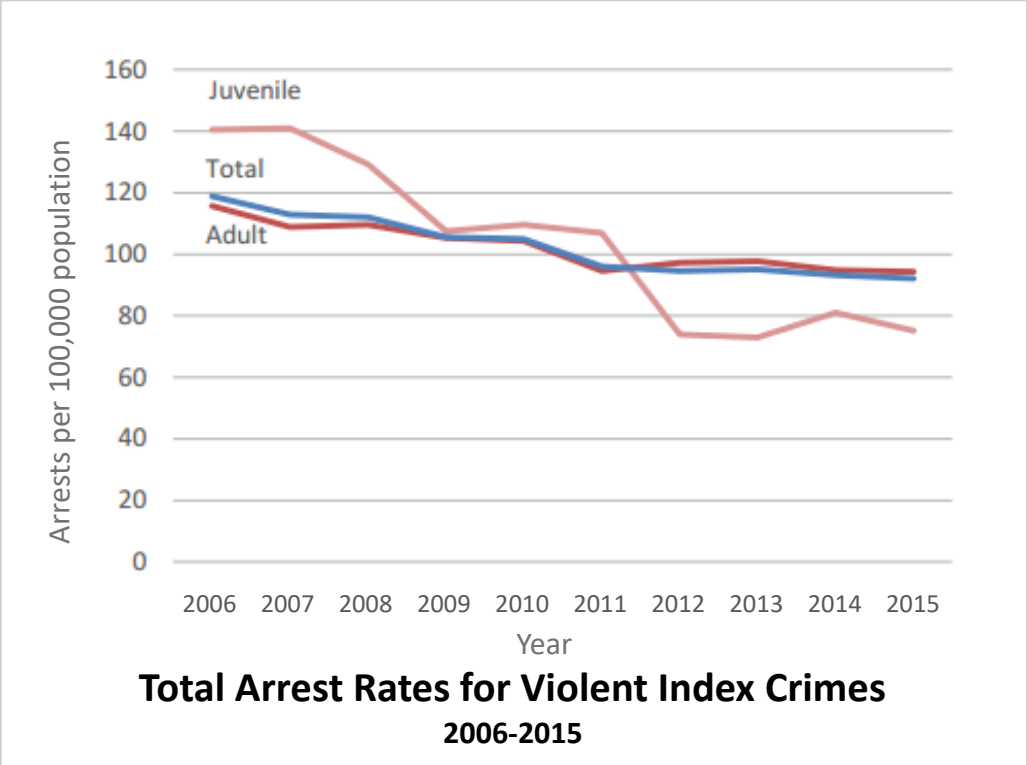

Figure 3
Source: Department of Criminal Justice Services. (2016). *Virginia crime and arrest trends 2006-2015.* Richmond, VA: Author. Retrieved from https://www.dcjs.virginia.gov/sites/dcjs.virginia.gov/files/publications/research/virginia-crime-and-arrest-trends-2006-2015.pdf

2012 (Council on Virginia's Future, 2016a). Between 2006 and 2015, the juvenile violent crime arrest rate for youths aged 10 to 17 years old declined almost 50% (Department of Criminal Justice Services, 2016).

The downward trend of arrests apparent at the national level is also apparent at the state level, with peaks and dips at similar times (see Figure 2). A comparison of Virginia juvenile arrest rates and adult arrest rates for violent index crimes reveals the juvenile arrest rate was higher than the adult arrest rate for about 20 years until 2012 (see Figure 3) (Department of Criminal Justice Services, 2016).

Institutional Anomie Theory and Arrest Rates

Institutional Anomie Theory (IAT) states that an imbalance in power among the institutions of education, family, economy, and government/polity results in greater crime rates (here substituted with juvenile arrest rates) (Rosenfeld & Messner, 1995). The relationship among these institutions will be discussed in chapter 2. Below is a discussion of trends and direct impacts of the social institutions education (Maume & Lee, 2003), family (Kposowa, Breault, & Harrison, 1995), economy (Currie, 2013), and government/polity (Administration for Children and Families, 2016) on crime/arrest. A brief deliberation of offender's age (Liu, 2015) and sex (Connell, Steeger, Schroeder, Franks, & Tebes, 2016) follows.

Institutions of education and family. Poor academic performance is a risk factor for individual delinquency and criminal offending (Chung, Mulvey, & Steinberg, 2011; Yun, Cheong, & Walsh, 2014). At the aggregate level, educational expenditures per pupil, which affects academic performance, may impact arrest rates (Jefferson, 2005; Koshal, Koshal, & Gupta, 2004; Maume & Lee, 2003). In the United States, expenditures on education have experienced trends opposite to juvenile arrest rates: the national percentage of GDP spent on

education generally increased from 1986 to 2011 (World Bank, 2016). These investments have generally increased at the state level as well (Virginia Department of Education, 2012-2016). Per pupil expenditures vary between states and localities (U.S. Census Bureau, 2015; Virginia Department of Education, 2012-2016), so juvenile arrest rates are expected to reflect similar variation.

State of the family and family members influence juvenile delinquency as well (Burt, Barnes, McGue, & Iacono, 2008; Rhoades, Leve, Eddy, & Chamberlain, 2016). At the micro-level, parental divorce affects decisions to engage in youth delinquency (Burt et al., 2008; Rhoades et al., 2016). At the macro-level, divorce rate is a strong predictor of homicide in American counties (Maume & Lee, 2003) and general crime in rural counties (Kposowa et al., 1995). Nationally, the divorce rate decreased from 4.0 divorces per 1,000 population in 2000 to 3.1 divorces per 1,000 population in 2015 (Centers for Disease Control and Prevention, 2017a). Virginia divorce rates have closely followed the national trend: rates decreased from 4.4 divorces per 1,000 population to 3.3 per 1,000 population (Centers for Disease Control and Prevention, 2017b).

Institution of economy and polity: Poverty and welfare. Economic conditions such as economic disparity, unemployment, and poverty have close relation to and even purportedly cause crime (Batton & Jensen, 2002; Bjerregaard & Cochran, 2008; Currie, 2013; De Coster, Heimer, & Wittrock, 2006; Travis, 1998). To complicate matters, poverty adversely affects academic performance, which in turn increases juvenile risk of offending (Chung et al., 2011; Council on Virginia's Future, 2016b).

National conditions of poverty have undergone trends similar to national juvenile arrest rates. According to a report prepared by social policy specialist Gabe (2015) for presentation to

Congress, the national child poverty rate peaked at 21.8% in 1983 before decreasing, then increasing again in the early 1990s. From 1996 to 2006, child poverty rates steadily decreased until 2007 when the United States experienced a recession and peaked in 2010 with a child poverty rate of 22.0% (Administration for Children and Families, 2016). It has since begun to decline once again. In 2011, Virginia ranked 8th among 50 states for the highest level of child poverty (Center for American Progress, 2017a). In 2016, although Virginia's child poverty rate remained stable, the state dropped in raking to 13th (Center for American Progress, 2017b). The government attempts to alleviate economic disadvantage through welfare programs such as the Temporary Assistance for Needy Families (TANF) program, which disseminates financial aid to impoverished households (Administration for Children and Families, 2016; Batton & Jensen, 2002; Messner & Rosenfeld, 1997).

Demographic factors: Age and sex. Offender demographic characteristics are often the first thread of discourse when discussing crime. Scholars especially pinpoint age as an influential factor for crime rates: the greatest likelihood for delinquency occurs during adolescence (Kim, Bushway, & Tsao, 2016; Liu, 2015; Piquero, 2015). Thus, any decrease in the total number of adolescents within the greater population is expected to result in decreased arrest rates. Nationally, the juvenile population has declined from 35.9% of the overall population in 1960 to 24% in 2010 (Howden & Meyer, 2011). In comparison, Virginia's youth population has remained relatively stable with marginal change: the juvenile population decreased from 24.7% of the overall population in 2005 to 22.3% in 2015 (U.S. Census Bureau, 2006, U.S. Census Bureau, 2016b).

As for sex, researchers agree that there exists some difference between males and females regarding criminogenic risk factors and subsequent criminal/delinquent behavior (Applin &

Messner, 2015; Bright et al., 2017; Connell et al., 2016; Hilterman, Bongers, Nicholls, & van Nieuwenhuizen, 2016; Pollock, Hill, Menard, & Elliott, 2016; Rhoades et al., 2016). Males are shown to be at greater risk for committing crime than females (Applin & Messner, 2015; Pollock et al., 2016), so a greater male population is expected to correlate with an increase in arrests. From 2000 to 2010, the United States male population has increased at a greater rate than the female population, with a percent change of 9.9 compared to 9.5 respectively (Howden & Meyer, 2011). Virginia's male population marginally grew between 2005 and 2015: the sex ratio of males for every 100 females increased from 95.1 in 2005 to 96.9 in 2015 (U.S. Census Bureau, 2006, U.S. Census Bureau, 2016b).

Purpose of Study

This study purports to ascertain which institutions and relationships among institutions, when controlling for demographic factors, best explains variation in juvenile violent crime arrests across counties and cities in Virginia. As the study's theoretical base, IAT examines and explains the relationships among the social institutions of economy, education, family, and the government or polity and their effect on serious crimes (crimes which cause significant financial or physical harm) (Rosenfeld & Messner, 1995). To examine these relationships, this study includes the following county and city level variables: demographic measures (age, sex, and race); economic measures (income inequality, child poverty rate, and unemployment rate); noneconomic measures (average monthly welfare per person adjusted for cost-of-living, divorce-to-marriage ratio, and per pupil expenditures); and juvenile violent crime arrest rates as the outcome variable.

Few scholars have used IAT to study juvenile behavior (Groß & Haußmann, 2011; Muftic, 2006; Stults & Falco, 2014), and none in the context of juvenile arrests. In a more recent

publication, Applin and Messner (2015) insist that IAT is intended for holistic criminological study. They contend that because IAT is intended as a holistic theory, IAT analysis requires examination of not only social institutions as they relate to crime, but also gender stratification as it relates to institutions and crime. If this assertion is true, then more work should be done to understand how the theory applies to juvenile justice.

Additionally, no other researchers have measured the economic institution by child poverty rate. If the economy dominates the noneconomic institutions (as is theorized by IAT, discussed in chapter 2), economy may be better measured by child poverty rate than other indicators selected by scholars. While poverty rate describes the economic conditions of whole households, child poverty rate describes the economic conditions of individual youth, who may be younger than the working age and thus unable to work. Child poverty, then, is not only more relevant for a study on juveniles, but better reflects the severity of a dominating economy. Thus, this study aims to fill the gaps in IAT literature on the subject matter of juveniles and regarding child poverty.

The present study may also make an impact in policy recommendations. If relationships among social institutions reveal considerable imbalance and significant effects on juvenile arrest, then communities may adjust direction of future policy, including budgetary plans, social campaigning to advocate a shift in community priorities, agency administrative policies, and legal protections.

In the pages to follow, chapter 2 will review the origins and foundations of IAT, review empirical studies on IAT, and list this researcher's hypotheses. Chapter 3 will describe this project's methodology, including the sources of data, sample size, variable selection and the rationale for the selection, and the analytical model. Chapter 4 will review this study's results.

Chapter 5 will summarize the results, discuss whether findings support this researcher's hypotheses, offer policy recommendations, discuss limitations, and make recommendations for future research.

Chapter 2: Literature Review

Durkheim's (1933) Theory of Anomie and Merton's (1938) Classical Strain Theory informed Rosenfeld and Messner's (1995) Institutional Anomie Theory (IAT). This section first describes IAT's theoretical predecessors, then discusses IAT's articulated theoretical propositions and the measurement of key theoretical concepts. This section concludes with a review of empirical studies of IAT and their main findings.

Theoretical Origins

IAT's fundamental tenets pivot on the Greek term "anomie," which refers to a lack of social norms/regulations and order (Besnard, 2015). Before Rosenfeld and Messner (1995) ever discussed this concept, Durkheim first outlined anomie in his written works *Division of Labor in Society* (1933) and *Suicide* (1951) with his Theory of Anomie. Merton (1938), who also impacted Rosenfeld and Messner's development of IAT, illustrated anomie in his Classical Strain Theory.

Theory of Anomie. Durkheim (1933) explained that society and the population are unified by common values and goals. Quick changes in social structure (i.e. political or social revolutions) cause diminishment or disintegration of norms and regulations. This diminishment/disintegration is called anomie. Because of anomie, citizens no longer have restraints against their greed. Without restraint, people do not feel attached to the community by common values, and they do not feel obligated to serve collectivist goals. Citizens who do not

serve the community are more likely to be labeled as criminals. Additionally, people who are unrestrained from lives of greed are more likely to act violently if they subsequently experience any restrictions. Thus, high levels of anomie may result in phenomena such as an increase in individuals being labeled as criminal offenders (Durkheim, 1933), increase in homicides, or increase in self-homicides or suicides (Durkheim, 1951).

Classical Strain Theory. Merton (1938) explained anomie as a phenomenon which affects social stratification of societies in which success is measured through monetary gain. In these societies, success should be achieved by individuals through conventional means in accordance with social norms (i.e. education and legal occupation), but citizens experience an equal pressure to accumulate wealth regardless of opportunity and ease of access to these means. When the goals are overemphasized and obstacles to success through conventional means exist, people experience strain. This strain creates a condition of "cultural chaos," otherwise known as anomie.

Whether persons internalize both conventional means and conventional cultural goals affects how they adapt to anomie. Merton (1938) describes five adaptations: conformity, innovation, ritualism, retreatism, and rebellion. Of these adaptations, conformists are citizens who have completely internalized the value of conventional means and cultural goals. They are satisfied with pursuit of goals using only legal means, regardless of whether wealth is ever achieved (pursuit itself is viewed as a form of success). Ritualists accept that conventional means of education and careers are essential according to social norms, but they have not internalized cultural goals. Ritualists only passively (ritualistically) participate in conventional activities (education and career) and do not actively pursue the goals. Retreatists reject both goals and conventional means and do not participate in conventional activities. They are often

frequent drug users. Rebels completely reject the goals and appropriate means and choose to reform society and institute alternative goals and means. They are essentially anarchists. Meanwhile, citizens who have internalized capitalist goals but have not internalized the necessity of conventional means create a new means to obtain success. These innovationists turn to unconventional, illegal means (crime) to obtain the wealth they seek (Merton, 1938).

IAT Theoretical Propositions

IAT consists of three key theoretical components: 1) anomie, introduced above, 2) culture, and 3) the social structure of institutional control (social institutions) (Rosenfeld & Messner, 1995).

Anomie. To reiterate, Durkheim (1933, 1951) stated that anomie is the dissolution of regulatory norms and lack of restraint against greed, while Merton's (1938) anomie results from an overemphasis of cultural goals and strain from inability to achieve said goals. Whereas Durkheim (1933, 1951) described anomie as a condition which causes an increase in certain phenomena, and Merton (1938) described anomie as a condition to which people adapt, Rosenfeld and Messner (1995) place anomie in the context of capitalism to discuss the role of social institutions in people's lives. Rosenfeld and Messner (1995), IAT's authors, theorize anomie as an imbalance in power between social institutions. The imbalance is a consequence of overemphasis of the economy and devaluation of noneconomic institutions. Institutional imbalance increases anomie, which results in increased economic pressure to commit crime and weakened institutional controls to restrain criminal behavior (Rosenfeld & Messner, 1995).

Culture. Rosenfeld and Messner (1995) discuss anomie in the context of capitalism, particularly American capitalism, which they say is characterized by an American Dream culture. They describe Dream culture with four value orientations: fetishism of money/monetary

rewards, achievement, universalism, and individualism. To explain in brief, these orientations state that 1) citizens must obtain monetary rewards to gain material success (fetishism of money); 2) material success dictates citizens' social success and worth (achievement); 3) all citizens must strive to obtain money (universalism); and 4) achievement is expected to be completed on an individual, competitive basis (individualism).

Social institutions. IAT outlines four major institutions in its discussion of society: the economy, education, family, and polity (also known as the political system or government). When there is no anomie, these institutions cooperate to ensure the survival of the overall community and the emotional, mental, and physical wellbeing of the population. Because American Dream culture emphasizes monetary achievement, however, the perceived importance and ascribed power of the economic institution dwarf the noneconomic institutions' importance and power. With this domination, economic values penetrate the noneconomic institutions and devalue their roles, so that noneconomic institutions are unwittingly forced to accommodate and serve the purpose of the economy. Moreover, noneconomic institutions cannot effectively function without significant monetary funds. For example, an educational system with insufficient funds may be unable to provide an effective teacher to student ratio, and the family cannot provide for their members' emotional and physical needs without jobs outside of the home. Below is a more in-depth discussion of the institutions' intended roles and their altered roles as a result of institutional imbalance (Rosenfeld & Messner, 1995).

Economy. The economy adapts to changes in limited resources and commodities. When there is an abundance or excess in resources, the economy provides a plethora of occupations to manufacture resources into usable products and commodities for the general populace. When resources decline, the economy adjusts the number of available jobs and product output to help

ensure the survival of society. With high levels of anomie, however, economic values and norms permeate into the areas of life previously governed by noneconomic institutions. Noneconomic institutions begin to use economic terms (such as "profit," "accountability," and "division of labor") in their everyday proceedings, and interactions with the noneconomic institutions are based on an economic reward system (Rosenfeld & Messner, 1995).

Polity. The polity performs regulatory duties to achieve collectivist goals which benefit all citizens. Such regulation includes oversight of interaction between the institutions (through the passage of laws) and the provision/protection of public safety. Thus, the polity establishes policies which restrict and counterbalance the influence of the other institutions, and establishes and maintains a justice system for public protection. When dominated by the economy, the polity is often preoccupied with taxation and regulating consumerism (Rosenfeld & Messner, 1995).

Family. The family is a source of informal social control that provides socialization into conventional society. This institution prepares family members for success as pro-social, law-abiding citizens. In addition to teaching its members socially acceptable values and norms, the family is intended as an emotional sanctuary from the stresses of life and influence of/interaction with the other institutions. When there is anomie due to economic dominance and institutional imbalance, families struggle to provide emotional solace because family activities are constrained by the work schedule. Even the worth of each family member is evaluated based on their participation in the economy (e.g. working parent v. stay-at-home parent) (Rosenfeld & Messner, 1995).

Education. Like the family, the educational institution teaches individuals conventional, prosocial values and norms to become law-abiding citizens. Citizens pursue knowledge through

education, and this pursuit enables them to experience personal development and enrichment. With economic domination, individuals pursue knowledge to increase chances of attaining a high-paying career rather than to obtain knowledge itself. Furthermore, benchmarks for knowledge attainment and success are based on a grade system akin to a payment reward system (students who best complete assignments receive a highly-valued payment of "A") (Rosenfeld & Messner, 1995).

Crime. The American Dream culture, which values monetary achievement over any other forms of success, contributes to economic domination of noneconomic institutions. When the economy is valued more so than other institutions, and when economic values and norms penetrate noneconomic institutions, the result is institutional imbalance and anomie. Consequently, the emphasis of culture and institutional imbalance invoke an unrestrained spirit of innovation (similar to Merton's (1938) adaptation of innovation), in which the use of legal means for success are de-emphasized (Rosenfeld & Messner, 1995). These conditions result in greater crime rates. Rosenfeld and Messner (1995) initially asserted that IAT explains only "serious" crimes (i.e. physically or financially harmful crimes), but they have since retracted this limitation.

Empirical Studies

Determining whether IAT is a viable theory is difficult for several reasons: 1) scholars cannot agree how to appropriately test IAT (i.e. at what level of measurement, whether tests must be cross-national, whether all IAT concepts must be tested to provide support for the theory, or whether studies should include tests for moderation effects) (Cancino, Varano, Schafer, & Enriquez, 2007; Chamlin & Cochran, 1995; Dolliver, 2015; Maume & Lee, 2003; Savolainen, 2000), and 2) because IAT concepts are abstract, operationalization of the concepts (i.e. how to

measure culture, or which variables appropriately represent institutions) can affect whether findings support IAT (Baumer & Gustafson, 2007; Bjerregaard & Cochran, 2008; Chamlin & Cochran, 1995; Cochran & Bjerregaard, 2012).

Unit of measurement. Rosenfeld and Messner's (1995) conception of IAT briefly described "American exceptionalism," or the idea that the United States has unusually high crime rates in comparison with other nations because of American Dream culture. Savolainen (2000) thus argues IAT should be studied using only national level data in order to provide cross-national comparisons and proof of whether American exceptionalism and American Dream capitalistic culture exist. Other criminologists, however, have tested IAT at lower levels of aggregation such as American states (Chamlin & Cochran, 1995), counties (Baumer & Gustafson, 2007; Hannon & DeFronzo, 1998; Maume & Lee, 2003), cities (Baumer & Gustafson, 2007; Groß & Haußmann, 2011; Stucky, 2003), and census blocks (Cancino et al., 2007) to determine the merit of IAT's other core components: the relationships between the institutions and crime. IAT has even been applied at the micro-level to study individual behavior (Groß & Haußmann, 2011; Muftic, 2006; Stults & Falco, 2014). Because the present study is interested in analyzing county and city level data in one state, the following review of literature will focus on macro-level studies.

Crime. Because of Rosenfeld and Messner's (1997) initial limitation regarding the intended scope of IAT being serious crimes, researchers have often studied IAT in the context of violent crimes (Batton & Jensen, 2002; Bjerregaard & Cochran, 2008; Cochran & Bjerregaard, 2012; Dolliver, 2015; Hannon & DeFronzo, 1998; Hughes et al., 2015; Maume & Lee, 2003; Messner & Rosenfeld, 1997). In addition to enjoying the benefit of theoretical approval, violent crimes are more likely to be detected and reported to officials, increasing the likelihood the

outcome measure is accurate and reliable (Batton & Jensen, 2002; Bjerregaard & Cochran, 2008; Dolliver, 2015).

Operationalization of institutions. As mentioned previously, scholars debate which variables are appropriate for measuring social institutions (Bjerregaard & Cochran, 2008; Chamlin & Cochran, 1995; Cochran & Bjerregaard, 2012). Variable selection is essential when operationalizing a social institution because it can impact yielded empirical findings and finding interpretations (Chamlin & Cochran, 1995; Cochran & Bjerregaard, 2012). The following is a review of macro-level empirical studies examining the effects of social institutions on crime.

Economy. Economic impact on the population has been operationalized primarily through three measures: unemployment rate, income inequality, and poverty rate (Batton & Jensen, 2002; Bjerregaard & Cochran, 2008; Chamlin & Cochran, 1995; Cochran & Bjerregaard, 2012; Hannon & DeFronzo, 1998; Messner & Rosenfeld, 1997; Rosenfeld & Messner, 2009; Savolainen, 2000; Stucky, 2003).

Studies which assessed the strength or dominance of the economy through unemployment rate have produced findings which support IAT: greater unemployment rates are positively associated with American national homicide rates (Batton & Jensen, 2002), total crime rates in 406 U.S. metropolitan counties (Hannon & DeFronzo, 1998), and total crime rates in 958 U.S. cities (Stucky, 2003). These statistically significant relationships support the assertion that adverse changes in economic conditions adversely affect levels of crime (Batton & Jensen, 2002; Hannon & DeFronzo, 1998; Stucky, 2003).

Research on income inequality also support that assertion regarding economy and crime: in studies of homicide rates in a sample of 49 nations (Bjerregaard & Cochran, 2008) and 45 nations (Messner & Rosenfeld), as well as a study on burglary rates in 10 nations (Rosenfeld &

Messner, 2009), income inequality had a positive relationship with the outcome. Higher levels of income inequality predicted higher crime rates. Only Bjerregaard and Cochran's (2008) findings were statistically significant, however, and the direction of the relationship changed in Rosenfeld and Messner's (2009) study when the United States was removed from the sample.

Hannon and DeFronzo (1998), in their study on metropolitan counties, created a deprivation index consisting of percentage of the population that is black, percentage of matriarchal households, and the poverty rate. This deprivation index was statistically significant in its positive relationships with property crime rates, violent crime rates, and total crime rates ($p < 0.001$). This statistically significant relationship further supports IAT's expectation that economic pressures resulting from economic dominance is related to higher levels of crime.

Family. While some researchers have operationalized the strength of the family based on apparent attachment to the institution by measuring its perceived level of importance (Hughes et al., 2015) and average amount of time devoted to family (Baumer & Gustafson, 2007), family is not often operationalized in this manner. IAT studies more consistently utilize variables related to divorce (Batton & Jensen, 2002; Chamlin & Cochran, 1995; Cochran & Bjerregaard, 2012; Dolliver, 2015; Jensen, 2002; Maume & Lee, 2003; Rosenfeld & Messner, 2009). Rather than representing the strength of the family institution, divorce is an indicator of a weakened, disrupted family institution (Bjerregaard & Cochran, 2008; Dolliver, 2015). Divorce disrupts family cohesiveness and creates dysfunction (Chamlin & Cochran, 1995; Dolliver, 2015), and occurrence of divorce suggests less general family commitment (Maume & Lee, 2003). Criminologists have thus measured family disruption through divorce-to-marriage ratio (Chamlin & Cochran, 1995; Cochran & Bjerregaard, 2012; Dolliver, 2015) and divorce rate (Batton & Jensen, 2002; Jensen, 2002; Maume & Lee, 2003; Rosenfeld & Messner, 2009).

Despite the regular use of family disruption measures, findings have been mixed regarding support for IAT. Maume and Lee (2003), for example, conducted negative binomial regression analyses on 454 counties, yielding findings that divorce rate has a significantly strong, positive relationship with instrumental homicide rates ($p < 0.01$) (homicides committed to obtain a monetary reward). Dolliver (2015) found that greater divorce-to-marriage ratios (in which divorce rates are higher than marriage rates) are correlated with higher rates of intentional homicide in 13 developed nations and 5 transitioning nations, but the finding was statistically non-significant. Maume and Lee's (2003) and Dolliver's (2015) results suggest that areas with higher levels of divorce also have higher levels of homicide. Meanwhile, divorce rate was insignificantly negatively associated with homicide in Cochran and Bjerregaard's (2012) ordinary least squares (OLS) regression analysis on 49 nations. This final finding directly opposes IAT, suggesting locations with greater family disruption may expect lower homicide rates.

Education. The educational institution has been operationalized the most inconsistently across studies. Dolliver (2015), for example, measured the strength of a nation's education institution through educational access or the percentage of working persons who completed their primary school education. Other criminologists chose to measure educational strength as commitment to education (Baumer & Gustafson, 2007) and the extent to which education for the sake of knowledge is valued (Bjerregaard & Cochran, 2008) through student-to-teacher ratio (Baumer & Gustafson, 2007; Bjerregaard & Cochran, 2008).

Education has also been operationalized using monetary measures: county level per pupil expenditures (Maume & Lee, 2003), percentage of government revenue spent on education in counties/cities (Baumer & Gustafson, 2007), and percentage of a nation's GDP (Cochran &

Bjerregaard, 2012). Dolliver (2015) notes that by operationalizing educational strength through monetary-based variables, researchers may be measuring strength of the economy rather than education. Consequently, empirical results may confound the effects of the economic and educational institutions, and conclusions drawn from the results may be incorrect (Dolliver, 2015). Scholars have defended use of these variables, however, as indication of commitment to or support for the educational institution (Baumer & Gustafson, 2007; Maume & Lee, 2003), and as a moderator of the economic-crime relationship (Baumer & Gustafson, 2007; Cochran & Bjerregaard, 2012), which is discussed in a later section of this chapter.

Using a sample of 24 nonmetropolitan counties and 52 metropolitan areas, Baumer and Gustafson (2007) applied IAT to an analysis of instrumental crimes (motor vehicle theft, burglaries, larcenies, and robberies), which are crimes committed to obtain a monetary reward. Their measure of educational strength (percentage of government expenditures on education) had a statistically significant negative association with instrumental crime rates. Maume and Lee (2003) used county level per pupil expenditures as a measure of education and found that education was not significantly related to instrumental homicide, expressive homicide (homicide resulting from an emotional outburst or argument), or total homicide rate. While Baumer and Gustafson's (2007) educational measure demonstrated support for IAT, in that areas with greater government educational expenditures had lower instrumental crime rates, Maume and Lee's (2003) measure did not provide support for the effects of education on county level homicide rates.

Polity. The political institution oversees public safety (Dolliver, 2015; Groß & Haußmann, 2011) and achievement of collective goals (Bjerregaard & Cochran, 2008; Dolliver, 2015). As such, polity has often been operationalized as voter turnout (Baumer & Gustafson,

2007; Bjerregaard & Cochran, 2008; Cancino et al., 2007; Chamlin & Cochran, 1995; Cochran & Bjerregaard, 2012; Maume & Lee, 2003), welfare receipt (Baumer & Gustafson, 2007; Cancino et al., 2007; Hannon & DeFronzo, 1998), or government decommodification policies (Batton & Jensen, 2002; Jensen, 2002; Messner & Rosenfeld, 1997).

Voter turnout represents a population's commitment to the polity in participating in processes aimed to achieve collective goals. Using data for 1,106 census block groups from San Antonio, Cancino and colleagues (2007) found that voter participation had a significant association with violent crime rates. Cochran and Bjerregaard (2012) also found that voter participation was negatively related to homicide rates among a sample of 49 countries. Both studies indicate that areas with higher rates of voter participation have lower rates of crime, as compared to those areas with less voter participation. These findings are expected according to IAT and are supportive of the theory.

Decommodification, another measure of political strength, refers to government policies which reduce citizen dependence on the economy, ensuring citizens can maintain a satisfactory standard of living and participate in noneconomic activities (e.g. getting married, raising children, voting, pursuing a college education) without needing to heavily rely on economic activities (e.g. employment) (Batton & Jensen, 2002; Messner & Rosenfeld, 1997; Savolainen, 2000). Messner and Rosenfeld (1997) created a decommodification index which included measures of universality of welfare coverage (whether welfare receipt is restricted by a person's current life situation), welfare accessibility, and whether welfare aid can completely substitute occupational income. Their decommodification index assessed unemployment welfare aid, sick leave pay, and elderly pension in a sample of 45 nations, and it was negatively associated with homicide rates (Messner & Rosenfeld, 1997). Nations that offer better access to more extensive

welfare programs have lower homicide rates. This association was robust – the relationship remained moderately strong even when accounting for economic discrimination, income inequality, sex ratio, and a "development index" (infant mortality, population growth, urban development, GNP per capita, life expectancy, and proportion of the population that is 65 years old or older) (Messner & Rosenfeld, 1997, p. 1402). Batton and Jensen (2002) challenged the robustness of Messner and Rosenfeld's (1997) results, however, noting the change in significance and magnitude of decommodification's effect on homicide when the United States or Syria were excluded from their sample.

Cancino and colleagues (2007) used a measure of welfare that captures the amount of dollar vouchers per Section 8 housing unit. They (2007) found that higher levels of welfare are related to lower levels of violent crime at the block group level. Thus, census block groups with higher amounts of Section 8 housing dollar vouchers had lower violent crime rates, as compared to those block groups with less welfare support. Other studies have used a composite measure of welfare to capture types of support provided by the polity. For example, Hannon and DeFronzo (1998) and Baumer and Gustafson (2007) created a composite measure of welfare by combining average monthly welfare per recipient adjusted for cost-of-living with percentage of families living under the poverty line who are also welfare recipients. Using this measure, Hannon and DeFronzo (1998) found that welfare support was significantly and negatively associated with violent crime. However, Baumer and Gustafson (2007), using the same measure did not find a statistical relationship between the welfare composite measure and instrumental crime (Baumer & Gustafson, 2007). When polity strength is operationalized as decommodification or welfare, findings generally adhere to IAT expectations: higher levels of decommodification and welfare

predict lower levels of crime (Baumer & Gustafson, 2007; Cancino et al., 2007; Hannon & DeFronzo, 1998).

Moderated relationships. The above review of literature discussed only additive relationships. Additive relationships predict the independent variables will have direct effects on the outcome (Fox, 1947; Treiman, 2009). Many scholars do not believe that additive relationships fully describe Rosenfeld and Messner's (1997) IAT (Cancino et al., 2007; Chamlin & Cochran, 1995; Dolliver, 2015; Maume & Lee, 2003; Savolainen, 2000). Many argue that Rosenfeld and Messner's description of the causal process underlying IAT implies a moderation effect (Cancino et al., 2007; Chamlin & Cochran, 1995; Dolliver, 2015; Maume & Lee, 2003; Savolainen, 2000).

A moderation effect occurs when an independent variable's relationship with the dependent variable varies in strength or direction by levels of a third variable (the moderator) (Fairchild & MacKinnon, 2009; Field, 2013). Statistically, the independent and moderator variables interact and cause variation in the dependent variable (Dawson, 2014; Verma, 2013).

Criminologists have found moderation effects which support IAT. For example, several researchers have found that decommodification and welfare, which measure strength of the polity, moderate the relationship between economic factors and crime rates (Cancino et al., 2007; Hannon & DeFronzo, 1998; Maume & Lee, 2003; Savolainen, 2000). Cancino and colleagues (2007) found that interaction between concentrated disadvantage (an index variable measuring unemployment, poverty, racial minority, and matriarchal households with children) and welfare significantly reduced crime at the block group level. Specifically, block groups that have higher concentrated disadvantage and greater welfare per person are associated with lower property and violent crime rates. Others have also found evidence for the interaction between economic

inequality and education on crime (Bjerregaard & Cochran, 2008). Bjerregaard and Cochran (2008) reported that countries with high levels of income inequality have higher levels of homicide; this relationship is stronger for nations with weaker educational systems (high illiteracy rates and low teacher-to-student ratios).

Some tests of moderation effects have yielded results that did not support IAT. Chamlin and Cochran (1995) reported that weakened family institution (indicated by high divorce-to-marriage ratio) moderated the relationship between unemployment and property crimes in the opposite expected direction: states with greater divorce-to-marriage ratios and high unemployment rates were associated with lower property crime rates. Bjerregaard and Cochran (2008) tested the moderating effect of family disruption (an index variable combining percentage of working women and divorce rate) on welfare expenditures (which indicated weakened economy in their study) and found that nations with greater welfare expenditures and greater divorce had greater homicide rates. IAT predicts that a weakened family institution and strong economy should result in higher crime rates, while a strong polity should result in lower crime rates. Chamlin and Cochran's (1995) finding directly opposes IAT. While Bjerregaard and Cochran's (2008) finding does not seem to support IAT, they explain that their finding may still support IAT because a nation may have higher welfare expenditures in reaction to high family disruption levels.

Research Question

The current study explores whether IAT can explain juvenile violent crime arrest rates in counties and cities in the commonwealth of Virginia. This study will examine the direct and moderating effects of economic and noneconomic institutions on juvenile violent crime arrests. After reviewing the theory and literature, this researcher makes the following hypotheses:

Hypothesis 1: Localities that have higher levels of economic dominance (measured as higher income inequality, higher unemployment rates, or higher child poverty rates) will have higher juvenile violence index crime arrest rates.

Hypothesis 2: Localities with stronger polities (higher adjusted average monthly welfare per person) will have lower juvenile violent crime arrest rates.

Hypothesis 3: The polity (measured as adjusted average monthly welfare per person) will moderate the effects of the economy on juvenile violent crime arrests.

Hypothesis 4: Localities with higher levels of family disruption (measured as higher divorce-to-marriage ratio) will have higher juvenile violent crime arrest rates.

Hypothesis 5: Family disruption (measured as divorce-to-marriage ratio) will moderate the effects of the economy on juvenile violent crime arrest rates.

Hypothesis 6: Localities with stronger educational institutions (measured as higher per pupil education expenditures) will have lower juvenile violent crime arrest rates.

Hypothesis 7: Education (measured as per pupil education expenditure) will moderate the effects of the economy on juvenile violent crime arrest rates.

Chapter 3: Methodology

Sources of Data

The present study examines data from 2011 to 2015 that was collected from public sources and did not include any identifiable private information as the level of inquiry is at county and city level. The data were derived from the Annie E. Casey Foundation's Kids Count Data Center, the Bureau of Labor Statistic's Local Area Unemployment Statistics, the U.S. Census Bureau's American Community Survey, the Virginia Department of Education's Superintendent's Annual Report, the Virginia Department of Social Services' Temporary Assistance for Needy Families Report, and the Virginia State Police's Crime in Virginia publication. For localities such as cities and counties, the U.S. Census Bureau provides 5-year averages rather than annual data. Because a majority of the variables of interest (six of 11) were derived from the U.S. Census Bureau, the annual data for all other variables for the years 2011 to 2015 were summed and averaged to improve comparability with the U.S. Census Bureau data. (See Appendix A for list of variables gathered from each data source.)

Virginia has 38 independent cities and 95 counties (n=133). In some cases, the Virginia Department of Education and Virginia Department of Social Services reported data for a county and city in combination rather than separately, making it impossible to analyze these localities individually. Consequently, 11 counties/cities were excluded from the sample. Additionally, Bedford City changed its status from independent city to township in 2013 and was re-

incorporated into Bedford County after 2013. Because the city's status changed during the study's time frame of interest, and the U.S. Census Bureau changed its method of reporting for Bedford City and County after 2013, Bedford County is also excluded from the sample. The Virginia State Police noted in its *2015 Crime in Virginia Report* that Henrico County's arrest counts were not verified by the Henrico County Police. Thus, Henrico County is excluded from the sample as well. Altogether, 13 localities were excluded from study (n=13): Bedford County, Fairfax County, Greensville County, Henrico County, James City County, Roanoke County, York County, Emporia City, Fairfax City, Falls Church City, Poquoson City, Salem City, and Williamsburg City. The final sample consists of 120 counties and cities. (See Appendix B for a case summary)

Variables

All variables included in this study are continuous and are averages for the years 2011 to 2015. The rationale for variable selection and descriptions for their interpretation are below. If the variable was subjected to further adjustment from its raw data form, the process of transformation is explained as well. All control variables, the Gini coefficient, and divorce and marriage data were gathered from the U.S. Census Bureau. Other data sources are discussed in the appropriate sections.

Dependent. The present study is interested in explaining juvenile behavior, specifically juvenile arrests for violent index crimes. Whereas previous criminologists have utilized the number or rates of violent crimes reported to police or government agencies as the dependent variable (Bjerregaard & Cochran, 2008; Cochran & Bjerregaard, 2012; Hannon & DeFronzo, 1998; Maume & Lee, 2003), this researcher uses juvenile arrests for violent index crimes because publications of juvenile-perpetrated violent crimes reported to the police either do not

exist or are not publicly available. While the Virginia State Police does not publish such service calls regarding juvenile-perpetrated violent crimes, the agency does publish separate arrest count data for juveniles and adults for all Virginia localities annually.

Juvenile arrest rates for violent index crimes were calculated using raw arrest counts published annually by the Virginia State Police (2012-2016). The Virginia State Police reports separate arrest counts for each arrestable offense: murder, negligent manslaughter, kidnapping, forcible sex offenses, robbery, aggravated assault, simple assault/intimidation, arson, extortion/blackmail, burglary, larceny, motor vehicle theft, counterfeiting/forgery, fraud, embezzlement, stolen property, vandalism, drug/narcotic offenses, nonforcible sex offenses, pornography, gambling, prostitution, bribery, weapon law violations, bad checks, curfew/loitering/vagrancy, disorderly conduct, driving under the influence, drunkenness, nonforcible family offenses, liquor law violations, being a peeping tom, being a runaway, trespass of real property, conspiracy, and "all [other non-traffic offenses]."

The current study uses the Federal Bureau of Investigation's (2016) definition of violent index crimes (aggravated assault, murder or nonnegligent manslaughter, rape, and robbery) to select the appropriate figures from the Virginia State Police raw arrest counts for rate calculation. Because the Virginia State Police does not report arrests for rape separate from other forcible sex offenses, this study includes all forcible sex offense counts, including forcible rape. The Virginia State Police defines forcible sex offenses as forcible rape, sexual assault using an object or tool, forcible sodomy, and forcible fondling. The outcome variable was created by dividing the average number of juvenile arrests from the years 2011 through 2015 by the average number of juveniles aged under 18 for the same period, and multiplied by 100,000. Thus, this juvenile violent crime arrest rate reflects the average number of juvenile violent crime arrests per 100,000

people. The Virginia localities included in the sample have juvenile violent crime arrest rates ranging from 0 arrests per 100,000 population to 132.46 arrests per 100,000 population.

Independent: Economic institution. The strength of the economy is measured here by three different variables: Gini index of income inequality, unemployment rate, and child poverty rate. Multiple studies have used the Gini index or unemployment rate as an economic indicator (Batton & Jensen, 2002; Baumer & Gustafson, 2007; Bjerregaard & Cochran, 2008; Chamlin & Cochran, 1995; Hannon & DeFronzo, 1998; Messner & Rosenfeld, 1997; Savolainen, 2000). Few, if any, studies have used child poverty rates.

Gini index of income inequality. The Gini index (also known as the Gini coefficient) measures relative economic deprivation (Cochran & Bjerregaard, 2012), a household's economic condition as it relates to another household in a given population. In other words, this variable measures the economic disparity between the wealthiest households and the least wealthy. Higher income inequality, as measured by a higher Gini coefficient, should indicate that there exists greater economic dominance and more economic pressure, and thus higher levels of anomie (Maume & Lee, 2003). The Gini coefficient scale spans from 0 to 1, with 0 indicating a geographic area with complete income equality between households, and 1 indicating complete inequality (U.S. Census Bureau, 2016c). Given the original scale, Gini index values are ratios. To change the ratios into whole numbers and allow for easier interpretation, the researcher multiplied the Gini index by 100, so that the range of the indicator now spans from 0 to 100.

Unemployment rate. Unemployment rate measures a distinct aspect of economic impact different from the Gini coefficient. Whereas the Gini coefficient evaluates economic conditions of household units, the unemployment rate considers the population's economic health as measured by employment status. To illustrate, a wealthy household does not necessarily require

all household members be employed. The Bureau of Labor Statistics (n.d.) publishes unemployment rate data monthly but also provides annual rates. The unemployment rate is an objective measure which aggregates individual-level economic conditions (Bureau of Labor Statistics, 2014). This variable is a percentage of people who are part of the work force but do not currently have a job and are currently seeking a job or were seeking a job in the past four weeks at the time of the Bureau of Labor Statistics' data collection (Bureau of Labor Statistics, 2014). The unemployment rate ranges from 0% to 100%, in which 0% indicates there is no unemployment in the locality, while 100% indicates the entire population is unemployed.

Child poverty rate. Because unemployment rate does not include people who are no longer seeking work or have exited the work force, this researcher utilizes child poverty to measure a third aspect of the economy. This study is interested in juvenile arrests, as opposed to previous studies which were interested in detecting institutional imbalance as they relate to total crime rate. Hence, instead of using poverty rate, which measures families without children as well as families with children, this study utilizes child poverty rates. The Annie E. Casey Foundation (2016) defines the child poverty rate as the percentage of the locality's child population that lives under the federal poverty line. Because the Annie E. Casey Foundation (2016) counts every child living under the poverty line rather than count every household (one household may have multiple children), child poverty rate is a more accurate measure of youth poverty. Raw child poverty data was provided in decimal form, so this researcher converted the measure into whole numbers for easier interpretation as well. Child poverty rate may be as low as 0% (no children in the locality is living under the poverty line) or as high as 100% (all children within the locality are living under the poverty line).

Independent and moderator: Noneconomic institutions. The present study analyzes the direct effects of noneconomic institutions (family, polity, and education) on crime and moderating effects of noneconomic institutions on the relationship between the economy and crime. A weakened family/family disruption is operationalized as divorce-to-marriage ratio (Chamlin & Cochran, 1995; Dolliver, 2015; Maume & Lee, 2003), polity is measured as the adjusted average amount of welfare aid distributed monthly per recipient (Hannon & DeFronzo, 1998; Messner & Rosenfeld, 1997), and education is operationalized as per pupil expenditures (Maume & Lee, 2003).

Family. Divorce is considered an indicator of a weakened family institution or more simply describes family disruption (Chamlin & Cochran, 1995; Dolliver, 2015; Maume & Lee, 2003). The U.S. Census Bureau (2016d) provides the percentage of a locality's population aged 15 and older that is married and percentage of the locality's population aged 15 and older that is divorced rather than providing a divorce-to-marriage ratio. Consequently, this researcher used marital status and population data from the U.S. Census to create divorce-to-marriage ratios. To create the ratio, the following steps were taken: 1) the percentage of married persons aged 15 and older were multiplied with the total locality population aged 15 and older to determine the number of individuals married; 2) the number of married persons was divided by the total population aged 15 and older, then multiplied by 1,000 to create a crude marriage rate; and 3) steps 1 and 2 were repeated using percentage of divorced persons aged 15 and older to create a crude divorce rate. These values were then combined in the following formula for divorce-to-marriage ratio: number of divorces per 1,000 population (the crude divorce rate) divided by the number of marriages per 1,000 population (crude marriage rate) (Chamlin & Cochran, 1995; Dolliver, 2015). The final ratio was then multiplied by 100 to convert it into a whole number,

making it easier to interpretation. The sample presents a divorce-to-marriage ratio range of 12.26 to 45.80. A greater divorce-to-marriage ratio indicates greater divorce rates than marriage rates in that locality.

Polity. The polity is operationalized as the adjusted average monthly amount of welfare aid per person in a locality. The welfare program of interest is the Temporary Assistance for Needy Families program (Virginia Department of Social Services, 2016), which was created to assist single mothers in providing care for their own children and reduce the risk of sending them into foster care (Office of the Federal Register, 1999). Because of the program's purpose, this measure is more appropriate as a measure of polity and its ability to insulate youth from adverse economic conditions and economic dominance.

The average monthly welfare amount is adjusted for cost of living for increased comparability between localities (Baumer & Gustafson, 2007; Hannon & DeFronzo, 1998; Maume & Lee, 2003). This study uses the same formula proposed by Hannon and DeFronzo (1998) to calculate cost of living: "dividing the average monthly welfare payment by the ratio of the local average gross rent paid by families to the national average gross rent paid by families" (p. 386). Instead of local average gross rent, the present study used housing cost data provided by the U.S. Census Bureau's (2016e) American Community Survey. The U.S. Census Bureau defines housing costs as rent, property/real estate taxes, home insurance payments, and utilities (U.S. Census Bureau, 2004). The range for the variable in this current study is $54.42 adjusted average welfare per person to $290.91 adjusted average welfare per person. Areas with higher adjusted average welfare per person reflect areas with a stronger polity.

Education. The best measure for comparability at a county/city level is per pupil expenditures (Virginia Department of Education, 2012-2016). Per pupil expenditures reflect the

strength of education in that such investments can improve the quality of education and services provided (Jefferson, 2005; Koshal et al., 2004), including teacher-to-student ratios (Jefferson, 2005). Locality per pupil expenditures from the 2011 to 2015 fiscal years are utilized. The Virginia Department of Education reports fiscal year expenditures as expenditures from the previous academic year. For example, the 2010-2011 academic year per pupil expenditures were reported for fiscal year 2011. This variable ranges from $8,604 to $19,026 in the current sample.

Control. To disentangle the effects of competing explanations from the effects of variables of interest, and to reduce risk of spurious relationships, the following variables are controlled: population size, sex ratio, age (the percentage of the population that is aged 10 to 17), and race (percentage of population that is a black juvenile) (U.S. Census Bureau, 2016f). The population size ranges from 2,244 to 448,290.[1] The range yielded from the study's sample is 68.3 males for every 100 females to 217.7 males for every 100 females. Virginia localities have populations with 3.9% to 13.5% aged 10 to 17 and 0% to 78.5% black juvenile. Higher sex ratios indicate a greater number of males to females. Populations with a sex ratio reflecting a greater proportion of males should have greater juvenile arrest rates.

Analytical Model

Multicollinearity. Before performing any other statistical analyses, a bivariate correlation analysis will be conducted to detect multicollinearity. Multicollinearity occurs when predictor variables are strongly correlated (Aldrich & Cunningham, 2016; Field, 2013; Montgomery, Peck, & Vining, 2012; Verma, 2013). Conceptually, multicollinearity indicates the variables may be measuring the same or related construct. Empirically, multicollinearity can impact confidence intervals and standard errors, which impact significance tests, and ultimately

[1] The researcher conducted several sensitivity analyses using the natural logarithm of population because of the skewed distribution of the population. Sensitivity analyses revealed that the substantive results for variables of interest (i.e. economic indicators and noneconomic indicators) did not change using either measure of population.

affect interpretation of results (Alin, 2010; Gebotys, 2010; Montgomery et al., 2012). In an unbiased or efficient analytical model, correlation coefficients between predictor variables should be small, and correlation coefficients between a predictor and the outcome variable should be greater (Aldrich & Cunningham, 2016). Generally, correlations greater than r=0.80 may indicate potential for high multicollinearity (Berry & Feldman, 1985; Lewis-Beck & Lewis-Beck, 1980).

The current study's bivariate correlation analyses on all variables of interest yield no Pearson r values greater than r=0.8 (see Table 1). The greatest correlation is between unemployment and child poverty (r=0.761). These two variables are economic indicators, so the relatively high correlation is not unexpected. The next highest correlation is between child poverty and the divorce-to-marriage ratio (r=0.692). The correlation between these two variables is also not unexpected because households which were once dependent on two parents for financial support are reduced to depending on one parent after a divorce. To reduce possible problems that high multicollinearity among these variables may introduce to the analytical models, the predictors will be mean-centered prior to OLS regression analysis (Jaccard, Turrisi, & Wan, 1990; Savolainen, 2000). Mean centering is completed by subtracting the mean of the variable from the variable; the transformed, mean-centered variable will have a mean of 0 (Field, 2013; Hayes, 2013; Savolainen, 2000).

In addition to running a bivariate correlation test to check for initial multicollinearity problems, the OLS regression and moderation analyses models will include variance inflation factors (VIF) for each variable. VIF values greater than 4.0 may indicate the presence of high multicollinearity (Fisher & Mason, 1981; Fox, 1991; Savolainen, 2000). (See Appendix C for tables with all VIF.)

Table 1. Bivariate Correlations

Bivariate Correlations

n=120

	Population	Sex Ratio	Age	Race	Juvenile Violent Index Crime Arrest Rate	Gini Index	Child Poverty	Unemployment	Welfare	Divorce-to-Marriage	Edu Expenditure
Population	1	-0.060	0.152	0.099	.313**	-0.158	-.313**	-.276**	-.413**	-0.094	0.104
Sex Ratio		1	-.227*	0.058	-0.162	-0.093	-0.092	0.059	-0.003	-0.069	0.086
Age			1	-.207*	-0.137	-.483**	-.391**	-.188*	-.247**	-.282**	-.320**
Race				1	.442**	0.153	.453**	.413**	-.223*	.484**	.209*
Juvenile Violent Index Crime Arrest Rate					1	0.008	0.133	0.106	-.222*	.206*	0.154
Gini Index						1	.544**	.391**	.397**	.522**	.180*
Child Poverty							1	.761**	.594**	.692**	0.034
Unemployment								1	.558**	.538**	-0.168
Welfare									1	.271**	-0.049
Divorce-to-Marriage										1	0.147
Edu Expenditure											1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Because preliminary analyses indicated high collinearity in the full model in which all economic and and noneconomic are included (some variables had VIF values of about 5.5), this researcher conducted analyses for each economic variable separately. Taking these steps reduced muticollinearity in all additive and multiplicative models. Substantive results stayed the same.

Table 2. Descriptive Statistics

Descriptive Statistics
Average of Data from 2011-2015
n=120

	Minimum	Maximum	Mean	Median	Std. Deviation	Skewness	Std. Error of Skewness
Population Count	2,244.00	448,290.00	53,297.22	25,610.00	79,696.79	3.178	0.221
Sex Ratio	68.30	217.70	98.74	96.50	15.39	4.630	0.221
Age	3.90	13.50	9.56	9.55	1.62	-0.399	0.221
Race	0.00	78.50	20.28	15.26	18.38	0.899	0.221
Juvenile Arrest Violent Index Crime Rate	0.00	132.46	34.81	25.39	31.56	1.175	0.221
Gini Index	36.46	54.01	43.72	43.27	3.94	0.369	0.221
Child Poverty	4.00	41.00	21.73	22.00	8.02	0.096	0.221
Unemployment	3.38	11.60	6.64	6.53	1.55	0.748	0.221
Welfare	54.42	290.91	150.04	148.15	49.27	0.547	0.221
Divorce-to-Marriage	12.26	45.80	23.60	22.41	7.39	0.962	0.221
Edu Expenditure	8,604.00	19,026.00	10,764.92	10,312.00	1,921.01	2.307	0.221

Skewness. Table 2 shows that the outcome has a skewness value of 1.175 and a standard error of skewness of 0.221. The skewness value is two times greater than the standard error, which indicates asymmetry or skewness in the outcome distribution (Abbott, 2011; Verma, 2013). To correct this problem, the variable is transformed using the natural logarithm[2] (Messner & Rosenfeld, 1997; Savolainen, 2000; Stucky, 2003).

[2] A natural logarithm cannot be taken of 0, and the minimum value of juvenile arrests is 0, so this researcher added a constant (1) to all estimates before taking the natural log of said estimates. The formula for outcome variable transformation is thus ln(viol+1). The outcome was mean-centered for multiplicative models.

Additive model. Because the outcome variable is continuous, ordinary least squares (OLS) regression is the chosen statistical technique (Field, 2013; Hayes, 2013). OLS regression measures the linear relationship between an outcome and a predictor from a given number of predictors (Huitema, 2011; Pollock, 2016; Scott & Marshall, 2015; Verma, 2013). In this study, OLS regression will yield twelve models measuring the additive, linear relationship between each predictor and the outcome. Each additive model will test only one economic indicator at a time, and additional noneconomic predictors will be added to examine any changes in the strength or direction of regression coefficients, et of all other variables. The threshold for significance will be 0.05 and 0.01.[3]

Multiplicative model. To assess how each noneconomic institution impacts the relationship between each economic indicator and juvenile arrest rates, a continuous by continuous interaction term will be added to each full additive model. An interaction term is created by multiplying two predictors (in this case, one economic and one noneconomic predictor) and represents the relationship between the predictor and outcome at different levels of the moderator variable (Aguinis & Gottfredson, 2010; Dawson, 2014). Thus, the study will yield nine multiplicative models. Although statistical significance will reveal that the predictor's effect on the outcome varies by the level of the moderator, a simple slope analysis will be conducted to provide a test of the differences in slopes by the level of the moderator, and to create a graphical representation of interaction (Bauer & Curran, 2005).

A simple slope analysis (also described as the pick-a-point approach) is completed by calculating the outcome when the predictor and moderator vary in value (Bauer & Curran, 2005; Dawson, 2014; Hayes, 2013). In this study, low levels of the moderator variable are defined as one standard deviation below the mean, average levels are fined as the mean, and high levels are

[3] All statistical analyses will be performed using SPSS version 24.

defined as one standard deviation above the mean (Aguinis & Gottfredson, 2010; Dawson, 2014; Hayes, 2013; Hayes & Matthes, 2009). This study uses Hayes' PROCESS macro program for SPSS (Field, 2013; Hayes, 2013), as a benefit of using Hayes' PROCESS program is that it yields the effect of the predictor variable on the outcome at the various levels of the moderator which describe the visual representation, as well as provides significance testing of the slopes at each level. The multiple line graph created by plotting the outcome values obtained from these calculations will serve as a visual representation of the relationship between the economic predictor and the outcome at low, average, and high levels of the moderator (Aguinis, & Gottfredson, 2010; Hayes & Matthes, 2009).

Chapter 4: Results

In the following chapter, this researcher reviews the descriptive statistics of the variables included in the analytical models. This researcher then reviews results for the additive (direct) and multiplicative (moderated) ordinary least squares (OLS) analyses.

Descriptive Statistics

Table 2 displays the sample's descriptive statistics. (See Appendix B for a full case summary.) The minimum and maximum values of several variables indicate a wide range of variation between the locations included in the sample. Of special note is the distribution of the 2011-2015 juvenile violent crime arrest rate, which ranges from a low of 0 arrests per 100,000 population to a high of 132.5 arrests per 100,000 population. The average juvenile violent crime arrest rate is 34.8 arrests per 100,000 population, while the median is 25.4 arrests per 100,000 population. Meanwhile, localities have populations with as few as 2,244 persons or as much as 448,290 persons for population size. Sex ratio has a wide variation across localities with a low of 68.3 males for every 100 females and a high of 217.7 males for every 100 females. Percentage of the population who are black juveniles ranges from 0% to 78.5%. Per pupil education expenditures varies widely across the sampled localities as well, with a low of $8,604 and a high of $19,026. Even child poverty rates vary widely across localities with a minimum of 4% and a maximum of 41%. These broad ranges reflect vast differences in the demographic and

socioeconomic characteristics of the locations' populations, as well as differences in levels of juvenile violent crime arrests.

The distribution of the Gini index of income inequality exhibits the least amount of variation across localities. The sampled counties and cities have Gini indices that are as low as 36.46 and as high as 54.01. This distribution yields an average of 43.72 as the Gini index, and a median of 43.27. Virginia appears to have relative uniformity in levels of income inequality across its localities.

Additive and Multiplicative Models

Below is a review of the multivariate analyses results. First, this researcher will review the key results from the additive and multiplicative models in which the economy was measured by the Gini index, followed by a discussion of the results from separate models in which the economy was measured by child poverty, and finally a set of models in which the economy was measured by unemployment rate.

Gini index of income inequality. Table 3 presents a summary of models which analyze the relationship predicting juvenile violent crime arrest rates when the economy is measured by the Gini index of income inequality. Models 1 to 4 illustrate the additive models, and Models 5 to 7 illustrate the multiplicative models. The Gini coefficient is statistically significant in the baseline model (Model 1), and is in the direction opposite than expected ($b = -0.075$, $p < 0.05$). The Gini coefficient's negative relationship with juvenile arrest rates implies that lower income inequality (or less economic pressure) relates to lower levels of crime. This finding is opposite to predictions according to IAT. All demographic variables are also statistically significant in Model 1. Sex ratio and percentage of the population aged 10 to 17 are each unexpectedly negatively associated with the outcome, however. The direction of the two demographic

Table 3. Gini Index: Regression Coefficients

Gini Index: Regression Coefficients

n=120

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant	6.712**	7.032**	7.118**	7.164**	4.941**	4.152**	4.105**
	(-1.269)	(1.248)	(1.248)	(1.263)	(1.241)	(1.254)	(1.263)
Population	4.288E-06**	2.948E-06	2.930E-06	2.981E-06	2.246E-06	2.684E-06	2.901E-06
	(1.431E-06)	(1.500E-06)	(1.498E-06)	(1.514E-06)	(1.478E-06)	(1.5133E-06)	(1.514E-06)
Sex Ratio	-0.026**	-0.026**	-0.025**	-0.025**	-0.027**	-0.024**	-0.025**
	(0.008)	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)
Age	-0.188*	-0.205*	-0.210*	-0.216*	-0.293**	-0.236**	-0.204*
	(0.083)	(0.082)	(0.082)	(0.085)	(0.085)	(0.085)	(0.085)
Race	0.021**	0.016*	0.011	0.011	0.013	0.013	0.011
	(0.006)	(0.006)	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)
Economy	-0.075*	-0.045	-0.062	-0.061	-0.067	-0.065	-0.055
	(0.033)	(0.035)	(0.037)	(0.038)	(0.036)	(0.037)	(0.038)
Welfare		-0.007*	-0.008**	-0.008**	-0.008**	-0.007*	-0.008**
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Divorce-Marriage			0.024	0.024	0.025	0.010	0.026
			(0.021)	(0.021)	(0.020)	(0.022)	(0.021)
Edu Expenditure				-1.767E-05	-7.377E-06	-2.018E-05	-1.449E-05
				(6.133E-05)	(5.916E-05)	(6.087E-05)	(6.131E-05)
Economy x Welfare					0.002**		
					(0.001)		
Economy x Divorce-Marriage						0.006	
						(0.003)	
Economy x Edu Expenditure							-1.740E-05
							(1.525E-05)

* p < 0.05, ** p < 0.01
Coefficients are unstandardized
Standard error for the unstandardized coefficient is in parentheses
Predictors/moderators were mean-centered prior to analysis
Outcome was mean-centered prior to analysis for multiplicative models

variables' regression coefficients imply that localities with a greater number of males to females have lower juvenile arrest rates, while localities that have a population with a greater percentage of juveniles aged 10 to 17 will also have lower juvenile arrest rates for violent index crimes.[4]

[4] Percentage of the population aged 10 to 17 was selected as the age control variable because it introduced less multicollinearity to the additive and multiplicative models than percentage of the population aged under 18. For

When the polity measure adjusted average monthly welfare per person is added in Model 2, the Gini index becomes statistically insignificant. When controlling for Gini, adjusted average monthly welfare per person has a statistically significant relationship with juvenile arrests in Model 2. Adjusted average monthly welfare per person is significant in all additive models, including the final, full additive model which includes the Gini index and all noneconomic predictors (Model 4). The polity measure's relationship with juvenile arrests is consistently negative, as is expected in accordance with IAT. This finding indicates that localities with higher average monthly welfare per person have lower juvenile arrest rates.

Model 5 is the first of the multiplicative models measuring the moderated effect of the Gini coefficient on the outcome. The Gini x welfare interaction term in Model 5 is the only statistically significant interaction term ($b = 0.002$, $p < 0.01$) in the Gini multiplicative models. The statistical significance indicates that the Gini coefficient's effect on juvenile violent crime arrest rates varies at different levels of average adjusted welfare per person. To better understand the interactive relationship, this researcher created Table 4 and Figure 4 using simple slope analysis to examine how the effects of income inequality on juvenile violent crime arrest rates varies at different levels of average monthly welfare per person.

Table 4 shows the results of the simple slopes analysis. The table displays the effect or slope of income inequality on the outcome at varying levels of welfare, and the degree to which the effect is statistically different. The results in Table 4 identify at what level of the moderator the economy will make a significant impact on juvenile violent crime arrest rates. The results of

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example, percentage of the population aged 10 to 17 and population had a Pearson correlation value 0.152, while percentage of the population aged under 18 and population had a Pearson correlation value 0.376. In the final additive model, percentage of the population aged 10 to 17 had a VIF value 1.6, while percentage of the population aged 18 had a VIF value 2.3. Although percentage of the population aged 10 to 17 has a negative relationship with juvenile violent arrest rates, which is opposite than theoretically predicted, while percentage of the population aged under 18 has a positive relationship, sensitivity analyses show that substantive results remain the same with use of the percentage of the population aged 10 to 17 variable.

the simple slope analysis are graphically illustrated in Figure 4. This depiction reveals that the relationship between the Gini coefficient and juvenile arrests for violent index crimes is negative and significant at low levels of the welfare distribution ($b = -49.267$, $p < 0.01$), but it is insignificant at average to high levels of welfare. Thus, the economy as measured by the Gini index of income inequality has a significant, negative effect on juvenile arrest rates in localities that have low average monthly welfare amounts per person (which indicates a weak polity), while the economy appears to have no significant effect on juvenile arrests in localities that have average or high levels of average monthly welfare per person.[5] Although the direction of the income inequality and juvenile violent arrest rate relationship is not in the expected theoretical direction (higher income inequality is related to less juvenile violent crime arrests), the interaction term does provide support for the argument that the relationship between the economy and crime is moderated by noneconomic institutions such as polity.

Child poverty rate. Table 5 summarizes the relationships predictive of the outcome variable when the economy is measured by child poverty. Models 8 to 11 are additive models, while Models 12 to 14 are multiplicative models. In the baseline model (Model 8), child poverty is negatively associated with juvenile arrests but is statistically insignificant. Additionally, in this same model, the percentage of the population that is juvenile aged 10 to 17 does not appear to have a significant effect on the outcome, but all other demographic variables do have statistically significant effects on the outcome. As what happened in the Gini index models, the effect that the sex ratio has on the outcome is unexpected: localities with more males for every 100 females have lower juvenile arrest rates. Population size, though, is in the expected

[5] In the final additive model in which the economy is conceptualized as income inequality and measured using the Gini coefficient (Model 4), all variables had VIF values less than 2. See Appendix C for a summary of VIFs.

Table 4: Effect of Gini on Juvenile Violent Index Crime Arrest at Varying Conditions of

Simple Slopes			
Moderator Welfare		Predictor Gini Index	
Conditional Effect		Effect (B)	p-value
- 1SD	-49.267	-0.163	0.004
Mean	0	-0.067	0.148
+ 1 SD	49.267	0.029	0.625

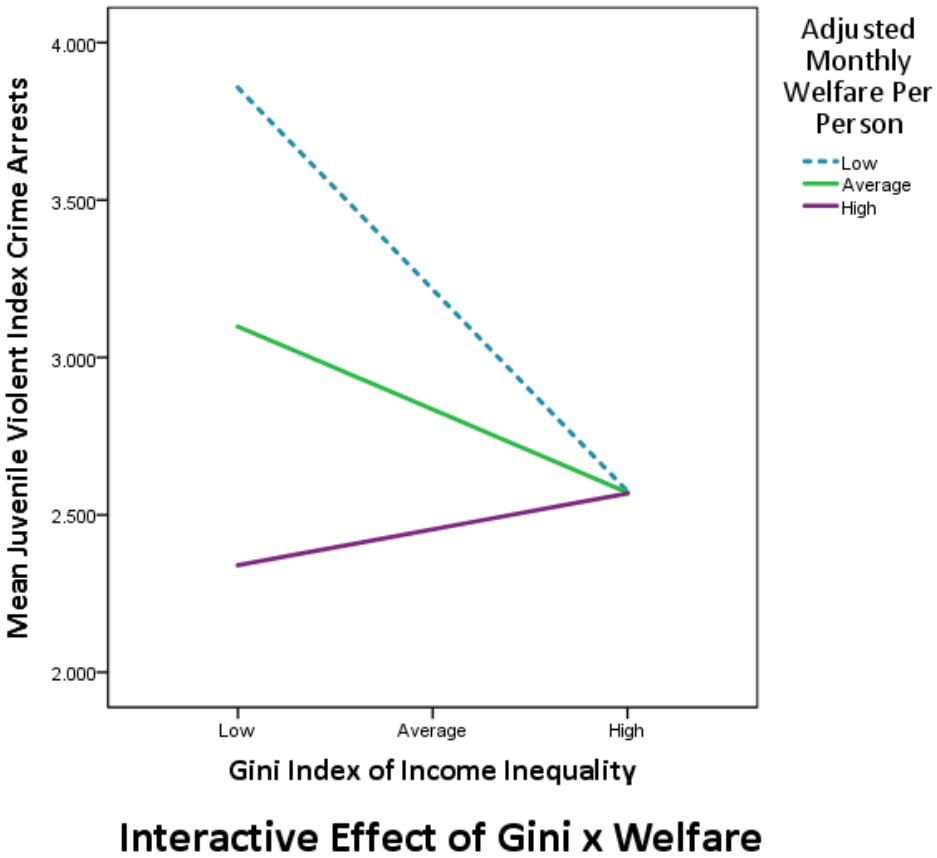

Figure 4: Simple Slopes Graph for Gini x Welfare

Table 5. Child Poverty: Regression Coefficients

Child Poverty: Regression Coefficients

n=120

	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14
Constant	6.009**	6.050**	6.049**	6.081**	3.275**	3.222**	3.628**
	(1.223)	(1.179)	(1.185)	(1.214)	(1.231)	(1.220)	(1.252)
Population	3.831E-06*	3.245E-06*	3.249E-06*	3.265E-06*	2.855E-06	3.011E-06	3.694E-06*
	(1.562E-06)	(1.519E-06)	(1.533E-06)	(1.544E-06)	(1.614E-06)	(1.564E-06)	(1.558E-06)
Sex Ratio	-0.025**	-0.021**	-0.021**	-0.021**	-0.021**	-0.021**	-0.024**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Age	-0.135	-0.136	-0.136	-0.140	-0.160	-0.162	-0.158
	(0.079)	(0.076)	(0.076)	(0.081)	(0.085)	(0.084)	(0.081)
Race	0.024**	0.005	0.005	0.005	0.007	0.006	0.001
	(0.007)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Economy	-0.026	0.037	0.037	0.037	0.032	0.032	0.044
	(0.019)	(0.027)	(0.030)	(0.031)	(0.032)	(0.032)	(0.031)
Welfare		-0.012**	-0.012**	-0.012**	-0.012**	-0.011*	-0.012**
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Divorce-Marriage			-0.001	-2.471E-04	0.003	-0.011	-0.005
			(0.021)	(0.022)	(0.022)	(0.024)	(0.022)
Edu Expenditure				-8.312E-06	-1.455E-05	-1.157E-05	3.864E-05
				(6.286E-05)	(6.332E-05)	(6.293E-05)	(6.923E-05)
Economy x Welfare					3.003E-04		
					(3.396E-04)		
Economy x Divorce-Marriage						0.002	
						(0.002)	
Economy x Edu Expenditure							1.472E-05
							(9.371E-06)

* p < 0.05, ** p < 0.01
Coefficients are unstandardized
Standard error for the unstandardized coefficient is in parentheses
Predictors/moderators were mean-centered prior to analysis
Outcome was mean-centered prior to analysis for multiplicative models

direction, in that counties and cities with greater population sizes have greater juvenile arrest rates for violent crimes.

In Model 9, the model in which adjusted average monthly welfare per person is added, child poverty remains insignificant. The reason for child poverty's insignificance may be due to

variance inflation factors (VIF).[6] In this same model, adjusted average monthly welfare per person again has a significant, negative relationship with the outcome ($p < 0.01$) when controlling for child poverty and other factors. The polity measure remains statistically significant in the final additive model (Model 11), as do the population size and sex ratio. As for multiplicative Models 12 to 14, they did not exhibit any moderation effects: none of the interaction terms were statistically significant. The noneconomic institutions do not appear to moderate the relationship between the economy and juvenile arrest rates for violent index crimes when the economy is measured by child poverty rate.

Unemployment rate. The additive and multiplicative models measuring unemployment rate as the economic predictor are displayed in Table 6. Models 15 to 18 are the additive models, and Models 19 to 21 are the multiplicative models. Baseline Model 15, similar to Model 8, yields statistically significant regression coefficients for population size, sex ratio, and percentage of the population that is black juvenile. Sex ratio remains consistent in its negative effect on juvenile arrest rates for violent index crimes. In the final additive model (Model 18), unemployment rate remains insignificant and positively associated with the outcome, while adjusted average monthly welfare is statistically significant and negative when controlling for unemployment ($b=-0013$, $p < 0.01$). All demographic variables except for percentage of the population that is a black juvenile are also statistically significant in Model 18. The percentage of the population that is aged 10 to 17 continues to have a negative effect on juvenile arrest rates. None of the interaction terms in Models 19 to 21 are statistically significant. Thus, there is no

[6] Child poverty has a VIF value of 4.009 in this model, which suggests presence of high multicollinearity. As discussed previously, high multicollinearity may affect significance tests. (See Appendix C for summary of all VIF.)

Table 6. Unemployment: Regression Coefficients

Unemployment: Regression Coefficients

n=120

	Model 15	Model 16	Model 17	Model 18	Model 19	Model 20	Model 21
Constant	5.431**	6.963**	6.923**	6.904**	4.074**	3.951**	4.146**
	(1.155)	(1.183)	(1.201)	(1.207)	(1.210)	(1.208)	(1.388)
Population	4.221E-06**	3.171E-06*	3.159E-06*	3.115E-06*	3.743E-06*	3.122E-06*	3.222E-06*
	(1.538E-06)	(1.496E-06)	(1.503E-06)	(1.514E-06)	(1.587E-06)	(1.514E-06)	(1.554E-06)
Sex Ratio	-0.022**	-0.025**	-0.025**	-0.025**	-0.025**	-0.024**	-0.026**
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
Age	-0.100	-0.186*	-0.183*	-0.177*	-0.172*	-0.194*	-0.186*
	(0.074)	(0.075)	(0.076)	(0.078)	(0.078)	(0.080)	(0.084)
Race	0.022**	0.004	0.003	0.002	-0.005	0.003	0.001
	(0.007)	(0.009)	(0.009)	(0.010)	(0.011)	(0.010)	(0.010)
Economy	-0.074	0.210	0.205	0.223	0.341*	0.174	0.226
	(0.086)	(0.115)	(0.117)	(0.129)	(0.158)	(0.138)	(0.129)
Welfare		-0.013**	-0.013**	-0.013**	-0.015**	-0.012**	-0.013**
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Divorce-Marriage			0.004	0.004	-0.001	4.476E-04	0.003
			(0.019)	(0.020)	(0.020)	(0.020)	(0.020)
Edu Expenditure				2.298E-05	5.143E-05	6.416E-06	3.884E-05
				(6.669E-05)	(7.010E-05)	(6.870E-05)	(8.210E-05)
Economy x Welfare					-0.002		
					(0.002)		
Economy x Divorce-Marriage						0.009	
						(0.009)	
Economy x Edu Expenditure							1.363E-05
							(4.082E-05)

* p < 0.05, ** p < 0.01
Coefficients are unstandardized
Standard error for the unstandardized coefficient is in parentheses
Predictors/moderators were mean-centered prior to analysis
Outcome was mean-centered prior to analysis for multiplicative models

evidence that noneconomic institutions moderate the economy's relationship with juvenile arrest violent crime arrest rates when the economy is measured by unemployment rate.[7]

[7] In the final additive model in which the economy is measured by unemployment rate (Model 18), all variables had VIF values less than 3.4. Unemployment had a VIF value of 5.1 in the model testing a possible interaction between adjusted average monthly welfare and unemployment (Model 19). All variables had VIF values less than 4 in Models 20 and 21, which tested for the interaction between unemployment and divorce-to-marriage

Summary of Findings

Of the economic measures, only the Gini index of income inequality gave any indication that economic dominance and anomie affects juvenile arrest rates for violent index crimes. The Gini index was statistically significant in the baseline additive model and became insignificant once a noneconomic institution (polity) was introduced to the model. Of the noneconomic institutions, the polity was the only institution to significantly affect juvenile arrest rates in the additive models. The polity also demonstrated a moderation effect on the relationship between the economy and juvenile arrests when the economy was measured by the Gini index. This moderation effect was significant only in localities with lower average monthly welfare amounts per person (or weaker polities). Thus, the economy as measured by the Gini index of income inequality and polity as measured by adjusted average monthly welfare yield the greatest evidence that institutional anomie exists, and that actions taken by the noneconomic institution to rectify anomie reduce juvenile violent crime arrest rates.

Demographic characteristics also generally have significant impact on juvenile arrest rates. Most consistently, sex ratio significantly and negatively affected juvenile arrests, regardless of how the economy was measured, and regardless of the type of statistical model, while population size was significant and positive in all models when the economy was measured by child poverty rate or unemployment rate. The percentage of the population that is aged 10 to 17 impacted juvenile arrests in the negative direction when the economy was measured by the Gini index and in every unemployment model (except the baseline model). Thus, localities with more males for every 100 females have lower juvenile arrest rates, localities with greater population sizes have greater juvenile arrest rates when the economy is indicated by

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ratio, and unemployment and per pupil education expenditures, respectively. See Appendix C for a summary of VIFs

child poverty or unemployment, and localities with a greater juvenile population between the ages of 10 and 17 have lower juvenile arrest rates when the economy is measured by the Gini index and generally when the economy is measured by unemployment. Demographic characteristics, then, affect juvenile arrest rates dependent on how economic dominance is measured.

Ch. 5: Discussion

Using Institutional Anomie Theory (IAT) as the guiding theoretical framework, this project examined the extent to which the economic and noneconomic institutions explain juvenile violent crime arrest rates in a sample of 120 counties and cities in Virginia. IAT posits the economy is overvalued and dominates noneconomic social institutions (polity, family, and education), which creates institutional imbalance, resulting in increased anomie and economic pressures. Increased anomie and economic pressure, combined with weak noneconomic institutional controls, relate to higher levels of serious crime. Many previous scholars have conducted empirical analyses on additive and multiplicative models to measure the direct, indirect, and moderating effects of the institutions on macro-level crime rates (Cancino et al., 2007; Chamlin & Cochran, 1995; Dolliver, 2015; Maume & Lee, 2003; Savolainen, 2000). This researcher extends this line of research to examine macro-level juvenile violent crime arrest rates, and posits that economic pressures, such as high child poverty rates, may contribute to high juvenile violent crime arrest rates. Thus, this researcher proposed and tested seven hypotheses:

Hypothesis 1: Localities that have higher levels of economic dominance (measured as higher income inequality, higher unemployment rates, or higher child poverty rates) will have higher juvenile violence index crime arrest rates.

Hypothesis 2: Localities with stronger polities (higher adjusted average monthly welfare per person) will have lower juvenile violent crime arrest rates.

Hypothesis 3: The polity (measured as adjusted average monthly welfare per person) will moderate the effects of the economy on juvenile violent crime arrests.

Hypothesis 4: Localities with higher levels of family disruption (measured as higher divorce-to-marriage ratio) will have higher juvenile violent crime arrest rates.

Hypothesis 5: Family disruption (measured as divorce-to-marriage ratio) will moderate the effects of the economy on juvenile violent crime arrest rates.

Hypothesis 6: Localities with stronger educational institutions (measured as higher per pupil education expenditures) will have lower juvenile violent crime arrest rates.

Hypothesis 7: Education (measured as per pupil education expenditure) will moderate the effects of the economy on juvenile violent crime arrest rates.

Multivariate analyses yielded no support for Hypothesis 1. While the Gini index of income inequality was statistically significant in its baseline additive model, this measure of economic dominance lost significance once noneconomic institutions were introduced in subsequent models. Similarly, the other measures of the economy (child poverty rate and unemployment rate) were not statistically significant in any of the additive or multiplicative models.

More consistent and empirically significant support was found for the direct effects of the polity on juvenile violent crime arrest rates. The polity, as measured by the average monthly welfare per person adjusted for cost-of-living, is statistically and negatively associated with the juvenile violent crime arrest rates, net of all other economic and demographic variables. This

finding supports Hypothesis 2: localities with stronger polities (as opposed to localities with weaker polities) have lower juvenile violent crime arrest rates.

Analyses detected significance for only one interaction term: the interaction between the economy, measured as income inequality, and the polity, measured as the average monthly welfare per person adjusted for cost-of-living. The Gini x welfare interaction term had a significantly negative effect on rates of juvenile violent crime arrests. Results from the simple slope analyses indicate that in localities with low levels of welfare distribution, the relationship between income inequality and juvenile violent crime arrests is negative and significant. However, income inequality has no effect on the juvenile violent crime arrest rate in localities with average to high levels of welfare support. These findings suggest that high levels of income inequality are associated with lower levels of crime in localities with a weak polity (low welfare support). Conversely, income inequality has no effect on crime in localities that have moderately strong or strong polities (average to high levels of welfare support).

Although results from the multiplicative analysis indicate that the statistically significant effect of income inequality on juvenile arrests is not in the theoretically expected direction (income inequality significantly and negatively affects juvenile violent crime arrest rates at low levels of welfare support), the remaining results on the Gini x welfare interaction term align with IAT expectations. Income inequality has no effect in areas with a moderately strong to strong polity, which supports the IAT expectation that strong noneconomic institutions reduce the effects of the economy on crime rates. Thus, the results indicate that the effects of the economy on juvenile violent crime arrest rates (positive or negative) vary according to the strength of the polity. These empirical findings support Hypotheses 2 and 3.

Although this study found support for the direct and moderating effects of the polity on juvenile violent arrest rates, the study did not provide evidence of support for the direct or moderating effects of the other noneconomic institutions. The effects of family disruption (as measured by divorce-to-marriage ratio) and education (per pupil education expenditure) on the outcome were insignificant. Thus, there is no support for Hypotheses 4, 5, 6, or 7.

In sum, this study found support for two of seven hypotheses. These findings, especially for welfare, largely agree with previous studies. Prior studies using measures of welfare as an indicator of the polity's strength have found that the polity is a predictor and moderator of crime (Baumer & Gustafson, 2007; Cancino et al., 2007; Hannon & DeFronzo, 1998; Maume & Lee, 2003; Messner & Rosenfeld, 1997; Savolainen, 2000). This study similarly finds that a strong polity predicts juvenile violent crime arrests: localities that have higher levels of average monthly welfare per person have lower juvenile violent crime arrest rates. This study found no support for the effects of family and education on juvenile violent crime arrest rates, consistent with other studies which produced mixed findings on the effects of family and education on crime (Bjerregaard & Cochran, 2008; Chamlin & Cochran, 1995; Cochran & Bjerregaard, 2012; Maume & Lee, 2003; Rosenfeld & Messner, 2009). These findings suggest that of the noneconomic institutions, the polity (measured as average monthly welfare amount per person), is the most significant influence for reducing county/city level juvenile violent crime arrest rates.

Policy Recommendations

This study and previous studies' findings consistently find that welfare has significant influence in reducing crime (Hannon & DeFronzo, 1998; Maume & Lee, 2003;), especially at low levels of welfare distribution. For example, in a sample of 454 counties in the United States, Maume and Lee (2003) found that welfare significantly and negatively affects homicide rates,

but only up to the third quartile. When their measure of welfare reached the third quartile, its relationship with homicide rates became positive (higher amounts of welfare were associated with higher homicide rates). This study's findings, similarly to Maume and Lee's (2003) findings, imply that increasing polity strength only through increasing the level of welfare distribution has diminishing returns for reducing levels of juvenile arrests. Thus, it is recommended that the polity maintain current levels of welfare distribution and address income inequality through additional techniques not involving the direct distribution of financial aid.

The Temporary Assistance for Needy Families is already attempting to approach income inequality from multiple standpoints: distribution of monetary aid and encouragement of work participation, among other things (Administration for Children and Families, 2016). However, government approach to encouraging work participation has been crude. Although the federal government has expanded child care subsidies and the Earned Income Tax Credit program, the government has also passed policy which financially penalize states and welfare recipients that do not meet work participation requirements (Administration for Children and Families, 2016). The guidelines for work participation also give little room for error, outlining the number of hours in a week or number of weeks in a year which may be counted towards work participation and welfare receipt eligibility (Administration for Children and Families, 2016). Ideally, this researcher recommends the guidelines regarding hours and weeks counted toward work participation be replaced or supplemented by educational/training programs, child care, and transportation that is mostly if not wholly free. According to IAT, institutional-based policies which aim to reduce juvenile and adult crime may be more effective if they decrease economic pressure while simultaneously providing multiple forms of government-based assistance.

Limitations

This study was subject to limitations which may have affected its yielded results. Limitations include: a short period of observation (only five years-worth of data were included and aggregated into a single measure); cross-sectional data and analysis (causality could not be established, and changes over time could not be assessed); exclusion of thirteen locations from the sample (attrition and sample selection bias), and measurement error (a limited set of variables were selected as measures of the institutions, and juvenile arrests were selected as the dependent variable). The limited observation period, as well as locality exclusion may have affected the validity and generalizability of the findings. The findings may change dependent on which localities are included/excluded in analysis, so the findings may not be applicable to all Virginia localities. For example, one excluded county Fairfax County, was an outlier with a population of 1,128,722. Locations with larger population sizes such as Fairfax County likely have higher juvenile arrest rates, so inclusion of localities with larger population sizes in analysis would likely change the results.

The operationalization of crime and the institutions may have also impacted the results and interpretation. As previously mentioned, juvenile arrests serve as a proxy measure of criminal activity. Official records often underestimate the true rate of crime, so rates of criminal activity may actually be higher than rates of juvenile arrest. As for the noneconomic institutions, two out of the three institutions were operationalized as variables monetary in nature. Dolliver (2015) warned against using finance-based variables because doing so may lead to high multicollinearity in the model and confound the effects of the economy with the effects of the noneconomic institutions. While this study did not find significant multicollinearity problems except in the case of child poverty rates, the lack of significance and inconsistent effect of the

family and education institutions may indicate that they were not adequate or appropriate measures.

Furthermore, the economic indicator unemployment rate does not include "discouraged workers" (those who are unemployed but are not currently seeking work or did not seek work in the last four weeks at the time of the Bureau of Labor Statistic's data collection) in the sample used to create the rate (Bureau of Labor Statistics, 2014; Chamlin & Cochran, 2000). The difference between the official unemployment rate and unemployment rate with discouraged workers included, however, is marginal; the difference is a few tenths of a percentage (Bureau of Labor Statistics, 2017a; Bureau of Labor Statistics, 2017b).

Recommendations for Future Research

This researcher recommends future studies on IAT consider using alternative measures of the economic and noneconomic institutions to explain variation in juvenile arrests. For example, when operationalizing the polity, scholars may want to consider increasing the scope of welfare to include social security, supplementary security income (SSI), and Medicaid. Inclusion of these programs in the welfare measure may provide a more multi-dimensional indication of welfare assistance. For example, there are situations in which other elderly relatives instead of parents raise youth and request money from the government to aid in funding their childcare. If the researcher is concerned with utilizing variables not financial in nature, voter turnout may be used as measure of a different dimension of polity strength.

Additionally, instead of using divorce-to-marriage ratio, one may want to consider using measures of female-headed/single-headed households. The divorce-to-marriage ratio is calculated using divorce rates and marriage rates. Marriage rates may be generally decreasing, while rates of children being born out of wedlock may be increasing. Because of these two

factors, using percentage of households that are female-headed or single-headed may be a more accurate measure of the family institution.

Other scholars may also want to examine the effects of the social institutions on juvenile arrest rates for other crimes. Prior research has indicated that the additive and multiplicative effects of the institutions vary depending on the type of crime (e.g. property crime versus violent crime, or instrumental crime versus expressive crime).

Finally, this study assumed that the Virginia population is committed to the American Dream and did not include a measure of culture in the research design, although IAT discusses the American Dream culture at length. Future research may benefit from examining the effect that levels of American Dream commitment in a population, in combination with measures of the weakness/strength of and institutional imbalance between the economic and noneconomic institutions, has on juvenile crime.

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Appendices

Appendix A

Description of Variables

Data Source **Agency** *Publication*	Variable
Annie E. Casey Foundation *Kids Count Data Center*	Child poverty rate
Bureau of Labor Statistics *Local Area Unemployment Statistics*	Unemployment rate
Virginia Depart of Education *Superintendent's Annual Report*	Per pupil education expenditure
Virginia Department of Social Services *Temporary Assistance for Needy Families Report*	Average monthly welfare per person
Virginia State Police *Crime in Virginia*	Juvenile violent index crime arrest rates
U.S. Census Bureau *American Community Survey*	Population Sex ratio % of population aged 10-17 % of population that is a black juvenile Gini index of income inequality Median monthly housing costs Divorce-to-marriage ratio
Note: 1) Median monthly housing costs and average monthly welfare per person used to created adjusted average monthly welfare per person. 2) Divorce-to-marriage ratio created using divorce and marriage counts provided by data source.	

Figure A1. Variable Data Sources

Appendix B

Case Summaries

Table A1. Sample: Location Type

Type of Location		
	Frequency	Percent
County	88	73.3
Independent City	32	26.7
Total	120	100.0

Table A2. Sample: Demographics

Study Sample: Demographics				
	Population	Sex Ratio	% Pop Aged 10-17	% Pop that is Black Juvenile
Accomack County	33,115	94.80	0.0880	0.3179
Albemarle County	103,108	91.90	0.0990	0.0960
Alexandria City	149,315	93.30	0.0540	0.2406
Alleghany County	16,066	96.50	0.0890	0.0742
Amelia County	12,777	103.30	0.0810	0.1981
Amherst County	32,148	92.80	0.1010	0.1737
Appomattox County	15,208	94.20	0.1030	0.2415
Arlington County	223,945	100.10	0.0580	0.0934
Augusta County	74,053	102.30	0.1000	0.0328
Bath County	4,583	95.00	0.1310	0.0193
Bland County	6,662	126.40	0.0950	0.0000
Botetourt County	33,155	98.10	0.1170	0.0307
Bristol City	17,524	87.10	0.0850	0.0835
Brunswick County	16,930	110.40	0.0840	0.5857
Buchanan County	23,486	102.50	0.0930	0.0224

Table A2. Sample: Demographics (Continued)

Buckingham County	17,068	124.80	0.0970	0.3074
Buena Vista City	6,666	85.00	0.1010	0.0000
Campbell County	55,012	94.00	0.0990	0.1339
Caroline County	29,349	97.80	0.0930	0.2972
Carroll County	29,856	100.40	0.1000	0.0068
Charles City County	7,118	97.90	0.0900	0.4805
Charlotte County	12,313	99.10	0.1070	0.3502
Charlottesville City	45,084	93.40	0.0580	0.2936
Chesapeake City	230,601	95.50	0.1150	0.3087
Chesterfield County	328,176	92.80	0.1210	0.2405
Clarke County	14,299	96.70	0.1040	0.0557
Colonial Heights City	17,515	86.90	0.1030	0.1949
Covington City	5,736	108.10	0.1190	0.1735
Craig County	5,212	92.30	0.1010	0.0068
Culpeper County	48,424	101.50	0.1160	0.1132
Cumberland County	9,859	100.40	0.1090	0.2835
Danville City	42,450	84.30	0.0910	0.5657
Dickenson County	15,463	103.10	0.1010	0.0091
Dinwiddie County	28,110	98.50	0.0960	0.3345
Essex County	11,151	86.10	0.1030	0.4881
Fauquier County	67,463	97.70	0.1140	0.0549
Floyd County	15,523	100.70	0.1030	0.0240
Fluvanna County	26,014	84.60	0.0900	0.0900
Franklin City	8,457	80.30	0.1140	0.6697
Franklin County	56,315	96.20	0.0920	0.0876
Frederick County	81,340	98.70	0.1080	0.0520
Fredericksburg City	27,395	87.50	0.0790	0.3021
Galax City	6,876	93.40	0.1100	0.0374
Giles County	16,907	96.10	0.0950	0.0156
Gloucester County	37,001	97.70	0.1040	0.0605
Goochland County	21,721	97.70	0.1070	0.1447
Grayson County	15,573	97.20	0.0840	0.0103
Greene County	18,938	95.20	0.0980	0.0567
Halifax County	35,506	90.90	0.1110	0.3943
Hampton City	137,081	93.20	0.0970	0.5423
Hanover County	101,340	96.20	0.1240	0.0838
Harrisonburg City	51,388	90.80	0.0640	0.0831
Henry County	52,580	92.60	0.0920	0.2360
Highland County	2,244	80.80	0.0880	0.0000
Hopewell City	22,279	89.90	0.1120	0.4598

Table A2. Sample: Demographics (Continued)

Isle of Wight County	35,740	96.00	0.1080	0.2093
King and Queen County	7,106	106.60	0.0910	0.2611
King George County	24,933	100.60	0.1230	0.1801
King William County	16,097	95.40	0.1090	0.1884
Lancaster County	11,129	89.00	0.0760	0.4399
Lee County	25,206	110.30	0.0860	0.0068
Lexington City	7,071	162.00	0.0390	0.2300
Loudoun County	351,129	98.20	0.1310	0.0713
Louisa County	33,986	97.20	0.1020	0.1556
Lunenburg County	12,558	110.40	0.0810	0.3339
Lynchburg City	78,158	88.60	0.0870	0.3875
Madison County	13,147	93.80	0.0980	0.0524
Manassas City	40,743	99.40	0.1120	0.1428
Manassas Park City	15,625	111.00	0.1080	0.0911
Martinsville City	13,624	82.40	0.0890	0.5181
Mathews County	8,880	85.90	0.1110	0.0702
Mecklenburg County	31,555	93.30	0.0930	0.3704
Middlesex County	10,717	97.90	0.0790	0.2061
Montgomery County	96,467	107.50	0.0700	0.0555
Nelson County	14,858	94.30	0.1000	0.1383
New Kent County	19,560	105.60	0.1120	0.0899
Newport News City	181,323	93.90	0.0920	0.4753
Norfolk City	245,452	109.10	0.0770	0.5008
Northampton County	12,184	94.40	0.0820	0.4175
Northumberland County	12,304	93.20	0.0890	0.4282
Norton City	4,007	68.30	0.0920	0.0429
Nottoway County	15,711	112.60	0.0900	0.4003
Orange County	34,596	95.70	0.1020	0.1113
Page County	23,843	96.50	0.1000	0.0049
Patrick County	18,264	97.20	0.0930	0.0883
Petersburg City	32,123	85.10	0.0810	0.7850
Pittsylvania County	62,794	96.30	0.0920	0.2039
Portsmouth City	96,135	92.60	0.0950	0.5888
Powhatan County	28,207	116.20	0.0990	0.0649
Prince Edward County	23,022	98.50	0.0740	0.4724
Prince George County	37,380	120.70	0.1090	0.3146
Prince William County	437,271	99.30	0.1190	0.2039
Pulaski County	34,528	99.60	0.0860	0.0517
Radford City	17,057	92.80	0.0710	0.1216
Rappahannock County	7,431	98.20	0.0870	0.0278

Table A2. Sample: Demographics (Continued)

Richmond City	213,735	90.80	0.0690	0.5954
Richmond County	8,989	135.10	0.0960	0.2383
Roanoke City	98,736	92.70	0.0860	0.3468
Rockbridge County	22,444	98.00	0.0800	0.0373
Rockingham County	77,785	96.20	0.1140	0.0126
Russell County	28,245	95.60	0.0930	0.0070
Scott County	22,570	101.50	0.0860	0.0040
Shenandoah County	42,724	94.20	0.0940	0.0239
Smyth County	31,734	95.60	0.0980	0.0069
Southampton County	18,410	110.40	0.0900	0.3215
Spotsylvania County	127,691	96.60	0.1270	0.1705
Stafford County	137,145	101.40	0.1350	0.1753
Staunton City	24,193	81.50	0.0750	0.1568
Suffolk City	86,184	92.90	0.1100	0.4500
Surry County	6,823	96.40	0.0890	0.5023
Sussex County	11,864	217.70	0.0610	0.5684
Tazewell County	43,870	98.50	0.0900	0.0193
Virginia Beach City	448,290	96.60	0.1010	0.2215
Warren County	38,481	100.40	0.1050	0.0173
Washington County	54,759	97.90	0.0910	0.0159
Waynesboro City	21,150	91.10	0.0890	0.1495
Westmoreland County	17,557	95.60	0.0850	0.3429
Winchester City	27,168	97.80	0.1030	0.1144
Wise County	40,530	107.40	0.0900	0.0271
Wythe County	29,190	96.70	0.0960	0.0528

Table A3. Sample: Predictors and Outcome

Study Sample: Predictor and Outcome Variables							
	Outcome	Predictors and Moderators/Mediators					
		Economy			Polity	Family	Education
	Juv Violent Index Crime Arrest Rate	Gini Index of Income Inequality	Unemployment Rate	Child Poverty Rate	Adjusted Avg Monthly Welfare Per Person	Divorce-to-Marriage Ratio	Per Pupil Edu Expenditure
Accomack County	49.1256	0.4624	7.12	0.310	162.21	0.1597	10,146
Albemarle County	21.1438	0.4817	4.80	0.110	105.74	0.1706	12,405
Alexandria City	68.4775	0.4378	3.96	0.150	88.47	0.2358	17,988

Table A3. Sample: Predictors and Outcome (Continued)

Alleghany County	12.5744	0.4215	6.52	0.220	204.59	0.2196	10,896
Amelia County	29.3955	0.3973	5.94	0.180	125.99	0.1600	9,186
Amherst County	12.1985	0.4187	6.06	0.200	154.05	0.1996	10,065
Appomattox County	11.9554	0.4256	6.48	0.230	151.95	0.2026	8,815
Arlington County	45.4560	0.4404	3.38	0.100	81.31	0.1772	19,026
Augusta County	1.3370	0.4329	5.22	0.130	196.92	0.1780	9,351
Bath County	0.0000	0.5099	5.20	0.160	205.56	0.2849	15,316
Bland County	0.0000	0.3834	6.60	0.190	247.53	0.1981	9,823
Botetourt County	23.2010	0.4318	5.14	0.100	120.92	0.1629	10,032
Bristol City	21.8429	0.4685	6.88	0.350	174.75	0.3030	10,189
Brunswick County	72.5960	0.4669	9.00	0.300	156.90	0.2642	11,467
Buchanan County	9.5148	0.4665	10.02	0.320	279.03	0.2267	11,381
Buckingham County	24.0366	0.4131	7.74	0.280	160.22	0.2161	10,628
Buena Vista City	28.0402	0.4257	6.94	0.240	166.65	0.1726	9,563
Campbell County	10.4872	0.4246	5.96	0.190	156.92	0.2070	8,953
Caroline County	45.0300	0.4009	7.04	0.190	105.55	0.2186	8,989
Carroll County	3.4178	0.4426	7.76	0.260	218.01	0.2230	10,207
Charles City County	0.0000	0.4766	6.98	0.190	145.90	0.2416	13,404
Charlotte County	0.0000	0.4453	7.76	0.290	184.41	0.2315	11,250
Charlottesville City	63.7880	0.5120	4.68	0.230	142.11	0.3156	15,597
Chesapeake City	48.2610	0.3983	5.80	0.140	86.95	0.1962	10,629
Chesterfield County	69.2644	0.4079	5.60	0.100	99.02	0.1958	9,062
Clarke County	12.9509	0.4454	4.80	0.100	89.27	0.2682	10,343
Colonial Heights City	101.5003	0.4138	6.30	0.170	164.82	0.2595	12,090
Covington City	0.0000	0.4297	8.16	0.260	219.42	0.3480	11,529
Craig County	0.0000	0.4039	6.66	0.210	187.75	0.3054	10,333
Culpeper County	70.1968	0.4036	5.38	0.150	87.98	0.1807	9,191
Cumberland County	9.4354	0.4341	6.54	0.280	131.16	0.2773	10,342
Danville City	89.0177	0.4912	9.52	0.390	177.39	0.3359	10,955
Dickenson Cnty	0.0000	0.4793	10.42	0.280	290.91	0.2252	10,801

Table A3. Sample: Predictors and Outcome (Continued)

Dinwiddie County	37.0919	0.4136	6.98	0.180	125.82	0.2439	9,480
Essex County	17.6706	0.4505	6.82	0.260	133.63	0.2489	10,378
Fauquier County	25.7258	0.4241	4.82	0.090	80.01	0.1687	11,627
Floyd County	0.0000	0.3962	5.22	0.200	209.20	0.2054	9,283
Fluvanna County	25.1482	0.3876	4.82	0.110	96.70	0.1758	9,307
Franklin City	38.2981	0.4681	9.06	0.350	124.85	0.4241	12,843
Franklin County	28.6986	0.4377	6.02	0.220	155.64	0.1644	10,269
Frederick County	25.6127	0.3981	5.26	0.120	99.37	0.1707	10,341
Fredericksburg City	21.1612	0.4736	6.60	0.230	139.26	0.3501	12,257
Galax City	27.7016	0.5286	8.14	0.360	199.93	0.3985	9,674
Giles County	11.5409	0.4295	6.74	0.180	196.83	0.2623	9,447
Gloucester County	36.5573	0.3964	5.20	0.150	101.26	0.1865	9,646
Goochland County	0.0000	0.5098	5.20	0.100	94.89	0.1322	10,822
Grayson County	7.1349	0.4692	8.76	0.290	258.74	0.2446	11,477
Greene County	17.3127	0.3818	4.90	0.140	105.82	0.1505	9,639
Halifax County	34.5411	0.4442	8.76	0.270	207.10	0.2427	10,007
Hampton City	130.7151	0.4220	7.48	0.230	140.06	0.3146	10,256
Hanover County	48.2801	0.3913	5.02	0.070	91.64	0.1647	9,160
Harrisonburg City	61.1943	0.4796	6.68	0.240	137.29	0.2230	11,689
Henry County	51.0948	0.4356	9.28	0.310	205.13	0.2519	9,462
Highland County	61.8934	0.4258	4.44	0.230	260.35	0.1585	18,120
Hopewell City	46.4948	0.4255	9.56	0.320	152.91	0.4136	10,470
Isle Of Wight County	44.2472	0.4156	5.76	0.140	97.27	0.1687	9,853
King and Queen County	14.5079	0.3736	6.14	0.210	143.35	0.2272	13,236
King George County	36.3238	0.3792	5.90	0.100	83.64	0.1537	8,604
King William County	57.1847	0.3694	5.64	0.130	94.45	0.1675	9,880
Lancaster County	11.6695	0.4507	7.82	0.270	144.45	0.2549	11,843
Lee County	0.0000	0.4601	8.02	0.360	260.19	0.2430	10,527
Lexington City	0.0000	0.5167	8.22	0.140	149.70	0.2169	9,062
Loudoun County	11.6987	0.3702	4.28	0.040	54.42	0.1242	12,601
Louisa County	5.5780	0.4263	5.60	0.170	112.26	0.1561	11,252
Lunenburg Cnty	83.3827	0.4177	6.84	0.300	170.26	0.3063	10,313

Table A3. Sample: Predictors and Outcome (Continued)

Lynchburg City	55.3993	0.4921	6.94	0.290	147.77	0.2669	10,819
Madison County	14.3515	0.4510	4.40	0.180	132.40	0.1782	10,576
Manassas City	88.4309	0.3952	5.26	0.170	98.46	0.1407	12,445
Manassas Park City	32.9412	0.3690	5.00	0.140	97.39	0.1670	10,214
Martinsville City	52.4285	0.5272	11.60	0.370	198.30	0.4398	10,846
Mathews County	13.2485	0.3973	5.24	0.180	137.21	0.1226	10,492
Mecklenburg County	79.2267	0.4473	8.58	0.290	172.03	0.2613	9,259
Middlesex County	0.0000	0.4516	5.48	0.250	134.46	0.2059	10,133
Montgomery County	24.7747	0.4978	5.46	0.170	175.14	0.1944	10,172
Nelson County	6.7304	0.4710	5.32	0.220	135.19	0.3200	12,124
New Kent County	69.7156	0.3790	5.06	0.100	86.12	0.1617	8,993
Newport News City	122.9195	0.4343	6.84	0.250	124.52	0.2993	10,742
Norfolk City	132.4590	0.4779	6.98	0.300	110.98	0.3343	10,782
Northampton County	83.3247	0.4987	8.20	0.340	165.90	0.2349	11,942
Northumberland County	0.0000	0.4325	7.56	0.290	154.02	0.1426	10,404
Norton City	25.2084	0.4907	7.52	0.340	199.61	0.4176	9,084
Nottoway County	25.3332	0.4452	5.90	0.300	141.15	0.2576	9,583
Orange County	18.1467	0.4113	6.00	0.160	108.57	0.1974	8,983
Page County	8.1836	0.4148	9.10	0.230	160.18	0.2279	9,431
Patrick County	0.0000	0.4303	8.06	0.280	235.21	0.2729	9,285
Petersburg City	129.3338	0.4577	11.32	0.410	149.69	0.3797	11,218
Pittsylvania County	6.3070	0.4153	7.12	0.220	176.52	0.2093	9,055
Portsmouth City	46.0346	0.4257	7.96	0.300	113.40	0.3571	10,634
Powhatan County	67.0240	0.3862	5.10	0.090	89.08	0.1652	9,962
Prince Edward County	16.2888	0.4486	7.98	0.290	160.42	0.2105	11,116
Prince George County	54.2442	0.3646	6.78	0.130	94.41	0.1871	9,288
Prince William County	62.6663	0.3752	5.04	0.100	81.97	0.1545	10,430
Pulaski County	28.0277	0.4324	6.98	0.230	184.34	0.2542	10,028
Radford City	61.2520	0.5261	7.26	0.200	162.32	0.2925	9,458

Table A3. Sample: Predictors and Outcome (Continued)

Rappahannock County	43.8820	0.4694	5.02	0.170	107.73	0.1346	12,887
Richmond City	62.0435	0.5401	6.84	0.370	126.06	0.4580	13,172
Richmond County	0.0000	0.4365	5.88	0.250	148.54	0.2489	10,899
Roanoke City	72.7376	0.4632	6.56	0.320	153.99	0.3953	11,710
Rockbridge County	14.9348	0.4342	5.74	0.180	155.31	0.2418	10,788
Rockingham County	19.1712	0.4298	5.12	0.140	154.01	0.1684	10,050
Russell County	110.8626	0.4547	8.24	0.260	230.92	0.2000	9,388
Scott County	18.7541	0.4647	6.58	0.260	250.41	0.1719	9,088
Shenandoah County	26.7498	0.4100	5.68	0.180	175.04	0.2050	10,211
Smyth County	24.9600	0.4679	8.80	0.270	201.82	0.2573	9,659
Southampton County	11.1422	0.4324	5.70	0.220	139.33	0.2319	10,311
Spotsylvania County	20.3258	0.3913	5.72	0.110	83.39	0.1714	9,742
Stafford County	27.8795	0.3712	5.50	0.080	70.91	0.1376	9,898
Staunton City	70.3562	0.4647	5.78	0.240	194.37	0.3257	10,314
Suffolk City	35.9143	0.4229	6.32	0.180	86.49	0.2063	9,663
Surry County	91.6019	0.3850	6.98	0.200	126.47	0.2068	17,062
Sussex County	22.7807	0.4365	8.80	0.280	157.53	0.3625	16,258
Tazewell County	25.4559	0.4910	8.08	0.240	202.40	0.2189	8,928
Virginia Beach City	62.8475	0.4124	5.28	0.130	89.17	0.2255	10,891
Warren County	4.5195	0.4092	6.14	0.160	118.39	0.2305	9,218
Washington County	17.2101	0.4561	6.16	0.210	177.97	0.2152	9,691
Waynesboro City	32.1915	0.3955	6.28	0.260	189.90	0.2484	10,013
Westmoreland County	5.9023	0.4283	6.72	0.290	127.03	0.3109	10,837
Winchester City	9.9035	0.4644	5.88	0.230	130.04	0.3414	11,926
Wise County	21.8776	0.4752	8.94	0.290	195.58	0.2337	9,665
Wythe County	27.0016	0.4523	7.30	0.220	188.36	0.2458	9,246

Table A4. Excluded Cases: Location Type

Type of Location		
	Frequency	Percent
County	7	56.8
Independent City	6	46.2
Total	13	100.0

Table A5. Excluded Cases: Demographics

Excluded Cases: Demographics				
	Population	Sex Ratio	% Population Aged 10-17	% Population that is Black Juvenile
Bedford County	76463	96.60	0.1040	0.0746
Emporia City	5672	84.90	0.1200	0.6391
Fairfax City	23402	96.30	0.0910	0.0376
Fairfax County	1128722	98.00	0.1050	0.1010
Falls Church City	13308	91.90	0.1250	0.0085
Greensville County	11760	163.90	0.0770	0.6429
Henrico County	318864	89.40	0.1080	0.3288
James City County	70673	94.00	0.1000	0.1645
Poquoson City	12077	95.90	0.1340	0.0101
Roanoke County	93633	91.60	0.1060	0.0733
Salem City	25165	90.00	0.0910	0.1184
Williamsburg City	14754	82.40	0.0430	0.2692
York County	66471	96.60	0.1260	0.1411

Table A6. Excluded Cases: Predictors and Outcome

Excluded Cases: Predictor and Outcome Variables					
	Outcome	Predictors and Moderator/Mediator			
		Economy			Family
	Juvenile Violent Index Crime Arrest Rate	Gini Index of Income Inequality	Unemployment Rate	Child Poverty Rate	Divorce-to-Marriage Ratio
Bedford County	19.7407	0.4233	5.54	0.130	0.1706
Emporia City	136.7881	0.5269	9.28	0.380	0.2339
Fairfax City	8.2573	0.3979	4.20	0.080	0.1472
Fairfax County	27.7183	0.4203	4.30	0.080	0.1393
Falls Church City	0.0000	0.4558	3.76	0.030	0.1555
Greensville County	10.3700	0.4706	7.40	0.270	0.2865
Henrico County	36.4110	0.4476	5.54	0.150	0.2537
James City County	56.0519	0.4371	5.26	0.110	0.1715
Poquoson City	72.3162	0.3943	4.92	0.070	0.1476
Roanoke County	25.5502	0.4121	4.88	0.100	0.2029
Salem City	32.4390	0.4442	5.54	0.140	0.2558
Williamsburg City	236.2911	0.5163	7.74	0.240	0.2901
York County	69.7168	0.3879	5.32	0.070	0.1187

Note: Welfare and education variables have separate tables.

Table A7. Excluded Cases: Predictor/Moderator/Mediator Polity

Excluded Cases: Polity	
Locality	Adjusted Average Monthly Welfare Per Person
Bedford County / City	134.11
Fairfax County / Falls Church City	77.28
Greensville County / Emporia City	162.53
Henrico County	107.25
James City County	94.49
Roanoke County / Salem City	137.11
Williamsburg City	101.63
York County / Poquoson City	106.56

Table A8. Excluded Cases: Predictor/Moderator/Mediator Education

Excluded Cases: Education	
	Per Pupil Educational Expenditure
Bedford County / City	8,867
Fairfax County / City	13,772
Greensville County / Emporia City	9,983
James City County / Williamsburg City	11,072
Falls Church City	17,275
Poquoson City	9,498
Roanoke County	9,637
Salem City	10,579
York County	9,795

Appendix C

Extra Supplementary Material

Table A9. Gini Index of Income Inequality: Variance Inflation Factors

Gini Index: Variance Inflation Factors (VIF) n=120	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant							
Population	1.058	1.215	1.215	1.232	1.264	1.249	1.234
Sex Ratio	1.122	1.122	1.127	1.128	1.135	1.139	1.128
Age	1.484	1.494	1.498	1.599	1.746	1.632	1.628
Race	1.072	1.177	1.659	1.671	1.683	1.691	1.675
Economy	1.407	1.592	1.851	1.856	1.861	1.864	1.888
Welfare		1.536	1.660	1.668	1.668	1.743	1.730
Divorce-Marriage			1.956	1.956	1.957	2.302	1.968
Edu Expenditure				1.174	1.178	1.175	1.176
Economy x Welfare					1.215		
Economy x Divorce-Marriage						1.356	
Economy x Edu Expenditure							1.074

Table A10. Child Poverty Rate: Variance Inflation Factors

Child Poverty: Variance Inflation Factors (VIF) n=120	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14
Constant							
Population	1.228	1.247	1.259	1.267	1.381	1.300	1.307
Sex Ratio	1.129	1.164	1.164	1.165	1.179	1.165	1.241
Age	1.286	1.286	1.287	1.445	1.568	1.556	1.474
Race	1.398	2.539	2.583	2.674	2.873	2.701	2.893
Economy	1.764	4.009	5.006	5.217	5.373	5.342	5.336
Welfare		3.085	3.098	3.129	3.156	3.471	3.148
Divorce-Marriage			2.101	2.133	2.190	2.608	2.170
Edu Expenditure				1.220	1.235	1.223	1.499
Economy x Welfare					1.368		
Economy x Divorce-Marriage						1.722	
Economy x Edu Expenditure							1.488

Table A11. Unemployment Rate: Variance Inflation Factors

Unemployment: Variance Inflation Factors (VIF) n=120	Model 15	Model 16	Model 17	Model 18	Model 19	Model 20	Model 21
Constant							
Population	1.177	1.226	1.227	1.236	1.366	1.236	1.291
Sex Ratio	1.055	1.069	1.102	1.107	1.107	1.114	1.345
Age	1.133	1.266	1.299	1.372	1.375	1.437	1.547
Race	1.323	2.115	2.396	2.633	3.490	2.655	2.909
Economy	1.378	2.719	2.830	3.367	5.093	3.850	3.382
Welfare		2.678	2.746	2.896	3.193	3.164	2.905
Divorce-Marriage			1.751	1.779	1.843	1.824	1.806
Edu Expenditure				1.393	1.547	1.478	2.094
Economy x Welfare					1.704		
Economy x Divorce-Marriage						1.406	
Economy x Edu Expenditure							2.182