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Exploring the Effects of Strain on Cross-national Lethal Violence: An Integrated Model

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Exploring the Effects of Strain on Cross-national Lethal Violence: An Integrated Model

By

Catrin Andersson

A dissertation submitted to the Graduate Faculty in Criminal Justice in partial fulfillment of the requirements for the degree of Doctor of Philosophy

The City University of New York

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Abstract

Exploring the Effects of Strain on Cross-national Lethal Violence: An Integrated Model

By

Catrin Andersson

Adviser: Professor Lila Kazemian, Ph.D.

Lethal violence is a global problem. In 2012, the United Nations documented 437,000 homicides worldwide (United Nations Office on Drugs and Crime, 2014b), and in 2012, the World Health Organization reported that there were 800,000 suicides internationally (World Health Organization, 2015c). There is a large body of research on violence in the social sciences. Although suicide and homicide are often studied separately, they have been said to share many of the same correlates, such as inequality and divorce (e.g., inequality and divorce; Nivette, 2011; Stack, 2000). There is a need to integrate theories drawn from different disciplines to better understand macro- and micro-level predictors of homicide and suicide. Drawing on data from multiple sources, the current research aims to test some of the postulates of the frustration-aggression hypothesis, strain theory, and the stream analogy model. This dissertation utilizes a quantitative approach to investigate the effects of objective and situational strains, and potential mediating effects of micro-level negative affect (e.g., frustration) on cross-national homicide and suicide rates, while controlling for macro-level predictors (e.g., population, culture and social control indicators). It is hypothesized that macro and micro-level indicators of social support moderate the relationship between strain, frustration, and violence, potentially acting as buffers against violence. Ultimately, this dissertation seeks to investigate whether homicide and suicide are different manifestations of frustration, but emerging from the same underlying source.

Acknowledgements

Most of all, this dissertation is the product of the work ethic handed down to me from generations of extremely hard working farmers and laborers. I am the descendant of individuals who have spent their entire lives, from early childhood to old age, physically exhausting themselves to provide opportunities for their families. I speak of my maternal grandparents, Ingrid and Nils, and my paternal grandparents, Signe and Karl; they have influenced my life trajectory greatly. More directly, the amount of dedication and perseverance (and madness at times) put into this project was possible due to the emotional and financial support of my parents, Christina and Karl-Henrik, as well as my dear big brother, Fredrik. Many other individuals have been integral to my accomplishments. In New York, I want to especially thank a few people whose support and close friendship have been essential: my cohort, Michelle, Mark, Jill, and my personal trainer, Tony. In Sweden, I want to thank all my friends who, I know, have supported me even though I have been absent for so many years.

Finally, I want to express a deep and sincere gratitude to my dissertation adviser, Dr. Lila Kazemian. Through ups and downs, you have always led me in the right personal and professional direction. You are the voice of reason that helped me get through these years; your level of student dedication is a real asset. The very last thank you goes to my dissertation committee members, Dr. Michael Maxfield and Dr. William Pridemore. Your deep wisdom, knowledge, and insight have been invaluable to me. I will be grateful in eternity for the professional growth I have experienced in your company.

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Chapter 1: Introduction

Lethal violence is a global problem. In 2012, the United Nations documented 437,000 homicides worldwide (United Nations Office on Drugs and Crime, 2014b), and in 2012, the World Health Organization reported that there were 800,000 suicides internationally (World Health Organization, 2015c). Homicides are not evenly distributed, however; roughly 94 percent occur in Africa, the Americas, and Asia, while only five percent occur in Europe (United Nations Office on Drugs and Crime, 2014b; see Figure 1). Although homicide rates have decreased in certain areas (e.g., North America, Asia and Europe) over the past two decades, they have been regarded as a growing problem in other areas (e.g., South America and the Caribbean; United Nations Office on Drugs and Crime, 2012).

It has been more difficult to identify a clear distribution of suicide trends, partly because these data are not readily available for most African nations. As seen in figure 2, suicide data for certain regions are estimates and not reported mortality cases. The World Health Organization (WHO) reports that the highest known suicide rates tend to be in Eastern Europe/Russia and parts of Asia, while the lowest rates cluster in Muslim nations and Central/South America (World Health Organization, 2012). The true international suicide figure is likely to be underestimated, given that there has been a lack of investigation of suicide trends in developing nations (Nock et al., 2008), and that prior research has suggested that non-European nations have markedly higher youth suicide rates (Wasserman, Cheng, & Jiang, 2005). As a result of the lack of research conducted in developing countries, suicide prevention programs worldwide have been adapted to the needs of developed nations (e.g., the U.S., Ireland, Norway, Malaysia; Matsubayashi & Ueda, 2011).

Figure 1. Homicide rates for 2012 (or latest year)

Map 1.1: Homicide rates, by country or territory (2012 or latest year)

Homicide rate

- 0.00 - 2.99
- 3.00 - 4.99
- 5.00 - 9.99
- 10.00 - 19.99
- 20.00 - 29.99
- >=30.00
- WHO estimates
- No data available

Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dashed lines represent undetermined boundaries. The dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. The final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

Source: UNODC Homicide Statistics (2013).

Figure 2. Suicide rates for 2012
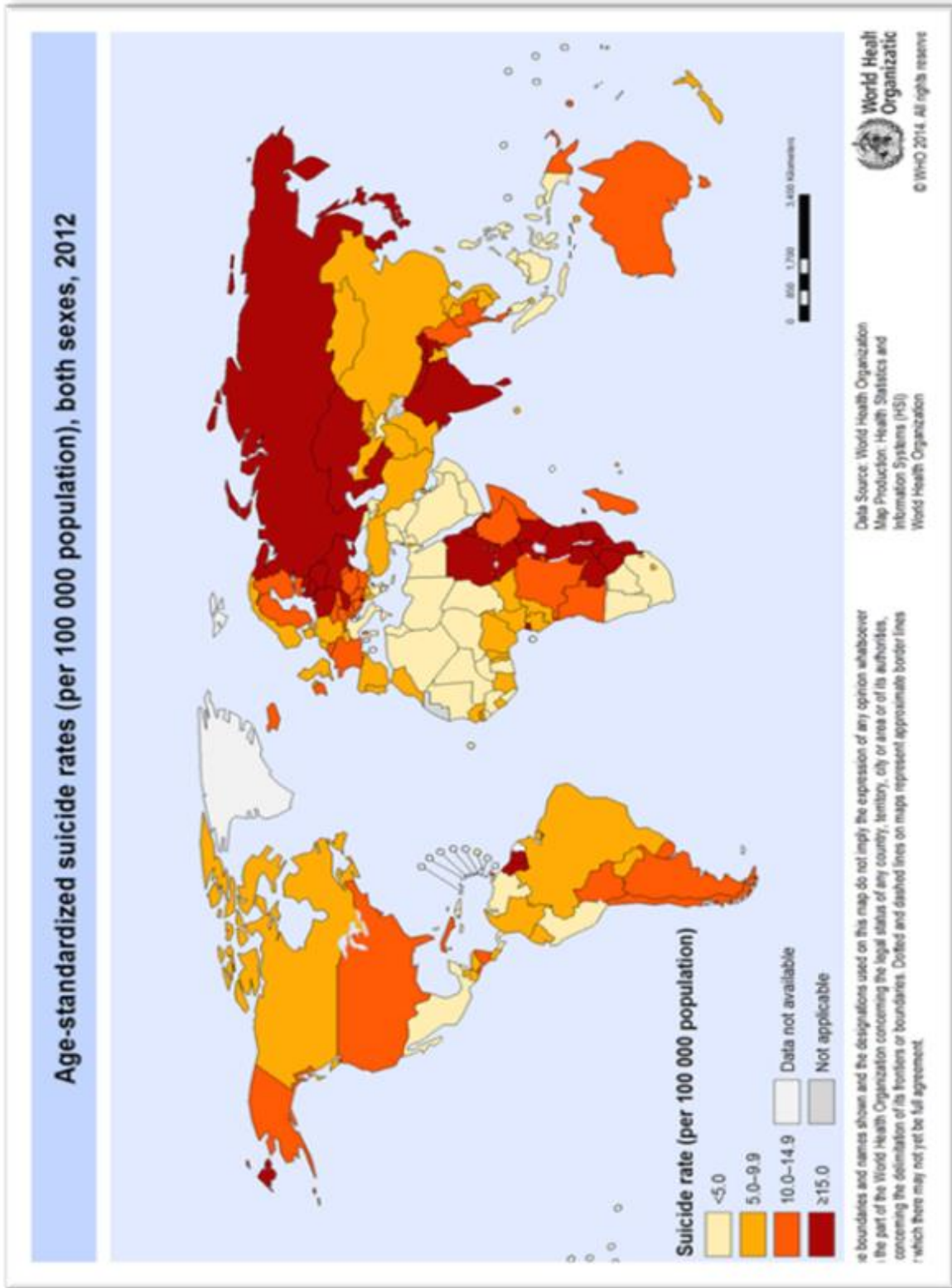
Age-standardized suicide rates (per 100 000 population), both sexes, 2012

Suicide rate (per 100 000 population)
- <5.0
- 5.0–9.9
- 10.0–14.9
- ≥15.0
- Data not available
- Not applicable

Data Source: World Health Organization
Map Production: Health Statistics and
Information Systems (HSI)
World Health Organization

World Health Organization

There is a large body of research on violence in the social sciences. Although suicide and homicide are often studied separately, they have been said to share many of the same correlates, such as inequality and divorce (e.g., inequality and divorce; Nivette, 2011; Stack, 2000). There is a need to integrate theories drawn from different disciplines to better understand macro- and micro-level predictors of homicide and suicide. The macro perspective emphasizes the role of structural factors, while the micro approach focuses on individual-level factors linked to violence. The idea that frustration causes violence, which can be turned either inward or outward, stems from a long tradition of mostly psychological scholarship. Influenced by Durkheim, Ferri, Morselli, and Freud, Dollard et al. (1939) developed the frustration-aggression hypothesis. This theory posits that frustration leads to aggression of varying magnitude, manifested as either homicide, suicide, or both. Based on the works of Dollard et al. (1939) and Henry and Short (1954), Unnithan et al. (1994) developed the stream analogy model of lethal violence, which aimed to investigate the combined effects of homicide and suicide (i.e., lethal violence rate; Unnithan, Huff-Corzine, Corzine, & Whitt, 1994). The authors also developed an indicator reflecting the degree to which suicides were more prevalent than homicides (i.e., the suicide-to-homicide ratio, or SHR). The stream analogy model of violence has been underutilized in criminological research. He and colleagues (2003, p. 38) argued that "…the viewpoint that homicide and suicide are the same event of different channels has not been very popular, partially because of Durkheim's opposition to the idea and partially because of the academic division of labor between criminology and suicidology."

Drawing on data from multiple sources, the current research aims to test some of the postulates of the frustration-aggression hypothesis, strain theory, and the stream analogy model. This dissertation utilizes a quantitative approach to investigate the effects of objective and

situational strains, and potential mediating effects of micro-level negative affect (e.g., frustration) on cross-national homicide and suicide rates, while controlling for macro-level predictors (e.g., population, culture and social control indicators). It is hypothesized that macro and micro-level indicators of social support moderate the relationship between strain, frustration, and violence, potentially acting as buffers against violence. Ultimately, this dissertation seeks to investigate whether homicide and suicide are different manifestations of frustration, but emerging from the same underlying source.

This dissertation consists of eight main chapters. *Chapter one* is the introduction. *Chapter two* presents a theoretical framework for explaining variations in lethal violence. It reviews some underlying concepts related to homicide and suicide and the main theories: the frustration-aggression hypothesis (FA), general strain theory (GST), the strain theory of suicide, and social support theory. *Chapter three* compares and contrasts relevant literature related to the theoretical framework as well as homicide and suicide. *Chapter four* contains a detailed description of the data and methods utilized herein. The main statistical analyses, corresponding diagnostics, and multiple imputation are discussed. These include weighted least squares (WLS) regression, logistic regression, factor analysis (FA), and multilevel structural equation modeling (MLSEM).

The next three chapters present the multivariate results for different types of lethal violence. *Chapter five* draws on homicide data from the United Nations (UN) to test the effects of strain and social support on homicide rates controlling for social control and population characteristics. Similarly, *chapter six* employs suicide data from the World Health Organization (WHO) to test the effects of strain and social support on suicide rates controlling for social control and population characteristics. In *chapter seven*, the same effects are tested on suicide-homicide ratios (SHR) and lethal violence rates (LVR). *Chapter eight* offers a discussion of the

findings in light of the hypotheses and in context of the previous literature on lethal violence. This chapter also discusses limitations and potential implications for theory and policy.

Chapter 2: Theoretical Frameworks Relevant to the Explanation of Homicide and Suicide

6.1   *Introduction*

Theoretical integration has been rather uncommon in research on cross-national violence (Koeppel, Rhineberger-Dunn, & Mack, 2013) and analyses have generally relied on small samples consisting mostly of highly developed nations (Nivette, 2011). It is unclear whether some of the major themes from Messner and Rosenfeld's influential book, *Crime and the American Dream* (S F Messner & Rosenfeld, 1994), are applicable to all cultural settings. In nations confronted with civil war, high rates of disease, or large-scale hunger, it seems implausible to assume that citizens are mainly concerned with the accumulation of wealth. Theoretical integration may also help develop broader frameworks for the explanation of homicide specifically. Koeppel and colleagues argue that "given the complexities involved in cross-national research, it seems prudent to develop attempts at theoretical integration, based on the existing evidence regarding significant predictors of cross-national homicide rates" (2013, p. 34).

The theoretical framework employed in this research draws heavily on the frustration-aggression (FA) hypothesis (as proposed by Dollard et al., 1939 and later extended by Henry & Short, 1954), the stream analogy model, general strain theory (GST), strain theory of suicide, and social support theory. The FA hypothesis and GST posit that aggression is a result of blocked goals, or strain, leading to frustration and anger. GST emphasizes the role of negative affect as a mediator between strain and crime, while strain theory of suicide applies these ideas to suicide. Finally, social support theory offers a conceptual bridge between these theories, emphasizing the potential moderating effects of multilevel social support.

6.2   *Dual Origins of Violence*

The study of lethal violence is not a novel investigation, and neither is the idea that homicide and suicide are different outlets for a similar force. The English word "suicide" has its roots in the 17th century and is closely connected with the concept of homicide. Suicide had previously been referred to as "self-murther" (Unnithan et al., 1994). The intricate links between the two types of lethal violence have existed through various eras: "…Western cultural traditions in religion, language, and law for centuries conveyed an image of suicide and homicide as morally, ethically, and legally equivalent. Self-murder was distinguished from other felonious homicides only by the fact that the victim was also the perpetrator" (Whitt, 1994, p. 11). This remains the case in some countries. For instance, in some Muslim and African nations, suicide (including attempt) is a crime punishable by law and is morally reprehensible.

Over a century ago, Italian scholars Morselli and Ferri ([1879]1882) investigated violence trends. They argued that suicide and homicide were parallel forms of violence with different forms of expression; suicide and homicide were said to be characterized by similar causes (such as gender and seasonality), but carried different meanings in distinct cultural contexts. For example, homicide was usually universally condemned, while some societies were more tolerant of suicide. At the same time, the relationship between homicide and suicide were theorized to be inversely related over time, known as dual law (Ferri, 1883-84; Morselli, [1879]1882). Durkheim initially agreed with the concept of dual law. However, with time, he grew to strongly disagree with this notion as well as the biological explanations of violence, although he could never disprove the dual law hypothesis (Durkheim, 1947 [1893]). Durkheim's ideas on violence stem from his hypotheses about the division of labor (e.g., forced social differentiation) and anomie. Anomie, a result of a rapidly modernizing world and lax social ties, occurs when there is

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an absence of regulation and restraint on individual passions. Individuals may develop

unattainable goals in the absence of adequate social regulation, leading to frustration and a state

of normlessness, which in turn result in increased suicides or crimes (Durkheim, 1951[1897]).

6.3   *Frustration-Aggression Hypothesis (FA)*

The idea of a single stream of aggression was advanced by psychoanalyst Sigmund Freud

(1920). He argued that suicide was simply murder turned inward. Heavily influenced by Freud,

Dollard, Doob, Miller, Mowrer, and Sears (1939) developed the frustration-aggression

hypothesis (FA). According to this hypothesis, frustration initially occurs when individuals are

blocked from achieving their desired goals, an idea similar to that of Merton (1938). Growing

frustration increases the likelihood of aggression. Not all individuals express their frustrations in

the form of violence; most individuals learn to restrain and control aggression in childhood, even

though these aggressive tendencies often persist in one form or another. Aggression may be

latent (e.g., dreams or fantasies) or manifest (i.e., acted out). Manifest aggression can be either

directed to the object of frustration (e.g., in the form of injuries) or it may be displaced (e.g.,

various types of self-harm or masochism). The strength of aggressive tendencies varies directly

with the intensity of anticipated punishment, such that individuals who expect severe punishment

may be more apt to restrain their aggression (i.e., inhibition of aggression varies directly with

strength of punishment anticipated). Criminality is a function of the discrepancy between the

absolute level of frustration and the absolute degree of anticipated punishment. Aggressive acts

are wide-ranging and are not limited to suicide or homicide, and frustration can lead to other

forms of violence as well. Engaging in aggressive acts may lead to reductions in future

aggression, acting as a form of catharsis, or psychological release. Finally, Dollard et al. (1939)

argued that acts of aggression may not entirely dissolve frustration, which may lead to residual aggression. Any residual aggression is usually regulated by different types of social control, such as parental or school discipline, and army and police regulatory functions (Dollard et al., 1939). Dollard et al. (1939) noted that frustration may have similar effects on violence in different political systems. The authors hypothesized that communist nations and dictatorships turn aggression outward because the government usually finds a scapegoat toward which to direct violence (e.g., the Jewish community in Germany). In democratic nations, individualism is more prevalent; as such, individuals tend to blame themselves for negative events, resulting in higher suicide rates (Dollard et al., 1939). These observations suggest an inverse relationship between political system and violence, namely that communist/autocratic nations are expected to have higher levels of homicide rates while democratic nations would be expected to have higher rates of suicide.

The frustration-aggression hypothesis was groundbreaking at the time that it was developed, and it has been revised over the last few decades. The most notable revision was carried out by Berkowitz (1988), who noted ambiguities in the propositions and definitions of frustration. He suggested that "…frustration is an obstacle to the attainment of an expected gratification" (p. 4). All blocked goals do not necessarily create frustration; frustration occurs when the goal is expected to be pleasant. Frustrations lead not only to manifest aggression, but also to hostile ideas and judgments (Berkowitz, 1988, 1989). Berkowitz (1989, p. 60) addressed the inconsistencies in the usage of the term frustration:

The word *frustration* is one of the many psychological concepts…too susceptible to radically different meanings. Even psychologists have used the term in many different

ways, sometimes referring to an external instigating condition and sometimes to the organism's reaction to this event.

Dollard et al. (1939, p. 7) referred to frustration as "an interference with the occurrence of an instigated goal-response at its proper time in the behavior sequence." They also noted that frustration ideally should be measured at the individual level, but that such data were lacking at the time of their publication. Thus, "…for this reason the alleged existence of frustration and the designation of aggression are purely inferential" (p. 143). There have been other attempts to measure frustration at the aggregate level (i.e., systemic frustration; Feierabend, Feierabend, & Nesvold, 1973) including loss of status as related to the economic cycle as a source of frustration (He, Cao, Wells, & Maguire, 2003; Henry & Short, 1954).

While Dollard et al. (1939) were influenced by Durkheim, the frustration-aggression hypothesis is a fundamental diversion from Durkheimian thinking in several ways. First, Dollard and colleagues approached violence as a single stream of aggression with different types of expressions, whereas Durkheim viewed suicide and homicide as fundamentally different in origin. Second, Dollard et al. (1939) argued that frustration occurs at the individual level, although a group can be affected by the same frustrating condition simultaneously; frustration is thus regarded as a distributive, and not collective, phenomenon (Dollard et al., 1939). Conversely, Durkheim believed in the collective conscience, and that the collective is an organism in itself (Durkheim, 1951[1897]).

6.3.1   *Revisions to the Frustration-Aggression Hypothesis*

The FA hypothesis has been widely applied in psychological studies, but the application to criminology is mainly traced to a handful of scholars, primarily Henry and Short (1954),

Wolfgang and Ferracuti (1967), and Palmer (1972). A little more than a decade after the

publication of the FA hypothesis, Henry and Short (1954) further developed the frustration-

aggression hypothesis by expanding on the effects of the economy on violence. They noted that

"suicide and homicide cannot be differentiated with respect to the source of the frustration

generating the aggression" (p. 4). However, they also argued that two individuals with similar

levels of frustration generated by economic forces may funnel this energy differently; one may

turn aggression toward him- or herself while another may turn against other people. Although

heavily influenced by Durkheim, Henry and Short (1954) argued that, in the U.S., a booming

economy leads to an increase in homicide and a decline in suicide rates, while opposite trends

are observed during a period of economic crisis.[1] Their main assumptions are that 1) aggression

is often a consequence of frustration; 2) business cycles lead to variations in the hierarchical

rankings of people or groups; and 3) frustration may occur if there is interference with

individuals' attempts to maintain status. Henry and Short's work reframed the frustration-

aggression hypothesis within a multilevel context.

  Similar to general strain theory, Henry and Short (1954) emphasized that individuals are

not homicidal or suicidal by nature; rather, these violent acts are rather shaped by circumstances.

Specifically, an individual's position in the status hierarchy (e.g., income status) and the

magnitude of relational ties (e.g., marital status) together determine how a person will respond to

any given frustration. Violence is turned inward or outward, depending on the degree of

attribution of blame (i.e., blame of oneself or others; attribution theory will be discussed later in

this chapter). This is related to external restraint, or the degree to which individuals must

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[1] Durkheim noted that both economic crises and booms may increase homicides and suicides because of the social disruptions that ensue as a result of these events.

conform to others' expectations. Individuals of low status may blame others for their frustrations because they are unable to conform to the upper class. As a result, violence is turned outward.

A few decades later, Palmer (1972) drew on Henry and Short's theory to argue that environmental conditions and individual perceptions of these conditions lead to aggression directed towards others, themselves, or society. Palmer also noted the importance of relative and absolute deprivation in generating violence. Specifically, "it is in reaction to others that we judge how badly off we are" (p. 13). Contrary to the FA hypothesis, Palmer posited that social control increases the level of aggression in individuals. The violent individual will act against those who exert social control or against society in general. If this person is blocked from acting out against others, he/she will take the frustration out on himself/herself. Crucial to the investigation of frustration and aggression is Palmer's assertion that the application of social control differs for homicide and suicide. In general, homicide is a crime and suicide is not. Consequently, more social control is exerted on outward violence (Palmer, 1972).

Dollard and colleagues laid the foundation for the basic mechanisms linking frustration to aggression, but many questions remained. Subsequent scholars further theorized about the mechanisms underlying the frustration-aggression link. The main difference between Dollard et al.'s (1939) theory and the extension by Henry and Short (1954) relates to the macroeconomic focus of the latter and the causal language: Henry and Short argued that aggression is *often* a result of frustration, whereas Dollard et al. argued that this is *always* the case. While improved, the FA theory was heavily criticized on theoretical and methodological grounds, and later on the basis of cultural issues (Unnithan et al., 1994). Woo (2004, p. 281) pointed out that "…Henry and Short systematically displayed how structural strain can incline towards higher rates of

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suicide and homicide. Although they explicitly invoked culture to qualify their theory where it did not hold up as predicted, they did not systematically integrate culture as part of their theory." The central caveat of the FA hypothesis for cross-national comparisons relates to the difficulty in measuring frustration across cultures (Palmer, 1965; Whitt, Gordon, & Hofley, 1972). These criticisms led scholars to regard homicide and suicide as separate phenomena altogether (Unnithan et al., 1994). It is likely that strains impact people of different cultures differently, in the same way that individuals react differently to the same strain. At the same time, it is not outlandish to theorize that frustration is a universal experience, even though culture may certainly impact how a given society responds to the consequences of frustration. The FA hypothesis does not make this connection, but with the integration of concepts from general strain theory, differential reactions to strains and frustrations can be explained in a manner that extends across cultures. (These links will be discussed later in this chapter.) Wolfgang and Ferracuti (1967) noted some issues with the FA hypothesis:

Scientific research on the frustration-aggression hypothesis is not easy, since it is difficult to avoid a circular logic. As McNeil has observed, 'If the experimenter predicts that an increase in aggressive behavior will result from an increase in frustration, he cannot then use the aggressive behavior as proof that he has increased frustration.' Also, the different forms of frustration vary very much, and the same applies to the phenomenology of the aggressive reaction to the frustration, as Rosenzweig pointed out (p. 144).

Stream analogy of lethal violence is not a theory or an extension of the FA hypothesis, but a methodological advancement that was guided by the FA hypothesis. In a further attempt to clarify the conceptual relationship between suicide and homicide, Unnithan et al. (1994) proposed a measurement model of suicide and homicide, which greatly enhanced the application

and testability of the FA hypothesis. Based on previous work (e.g., Gold, 1958; Whitt et al., 1972), the model was conceptualized with the lethal violence rate (LVR) and the suicide-to-homicide ratio (SHR)[2], theorizing that the two types of violence originate from the same source (i.e., stream analogy).

Attributional styles or locus of control, which refer to whether blame for negative events is turned to oneself or to external sources, determine the direction of the lethal violence to some extent (Unnithan et al., 1994). Cognitive distortions, which are "inaccurate ways of attending to or conferring meaning on experience" (Barriga, Landau, Stinson, Liau, & Gibbs, 2000, p. 37), have long been used to explain criminal behavior and violence. Barriga et al.'s (2000) theory suggests that people with self-debasing cognitive distortions (i.e., "internalizing") turn harm inward, while self-serving cognitive distortions (i.e., "externalizing") lead to outward harm. While no one is immune to the effects of frustration, cognitive distortions may partly explain whether aggression results in homicidal or suicidal acts.

6.4   *General Strain Theory (GST)*

There are explicit similarities between the frustration-aggression hypothesis and general strain theory, and some studies have integrated the two perspectives (Felson, Osgood, Horney, & Wiernik, 2012). General Strain Theory (GST) is a micro-level theory based on Merton's argument that there is some degree of discrepancy between institutionalized means and cultural goals, with a particular emphasis on the negative affect that results from this disjunction (i.e., strain). GST was designed to be a broad and general theory of crime (Agnew & DeLisi, 2012).

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[2] LVR is the combined total of homicides and suicides; SHR is the ratio of suicides to homicides.

GST is generally used to explain how strain or stress may lead to individual-level offending. Specifically, it investigates why strain causes crime and which specific types of strain are associated with offending (Agnew, 1992, 2001, 2006, 2009). Strains are defined as "events or conditions that are disliked by individuals" (Agnew, 2006, p. 169). Strain occurs in three scenarios: when a positive stimulus is lost, when a negative stimulus occurs, and when there is a failure to obtain something that one desires. Strains are most conducive to criminal behavior when they "(a) are seen as high in magnitude, (b) are seen as unjust, (c) are associated with low [individual level] social control, and (d) create some incentive or pressure to engage in crime" (Agnew, 2009, p. 172).

Similar to the FA hypothesis, GST does not suggest that all strains or negative emotions lead to crime or violence. The FA hypothesis posits that the energy created by frustration can either lead to non-physical outlets (e.g., dreams) or it can be regulated by different types of social control. GST, on the other hand, describes three different coping mechanisms developed by individuals to manage the negative emotions resulting from strain (Agnew, 1992). In cognitive coping, individuals cognitively reshape the undesirable experience. In behavioral coping, strain is managed by engaging in a given behavior, which may include crime. Emotional coping strategies enable individuals to ignore or redirect negative emotions by engaging in activities/behaviors that alleviate these feelings. This type of coping is similar to behavioral coping, though it addresses the negative emotion resulting from strain rather than the strain itself Although GST is a micro-level theory, Agnew (1999) revised the theory to make it relevant to the explanation of community-level crime. He argued that "crime rates are an aggregation of individual criminal acts" (p. 123), further indicating the importance of empirically testing multilevel relationships.

6.4.1 *Subjective and Objective Strain*

There is an important distinction between "subjective" and "objective" strain. Subjective strains are "events and conditions that are disliked by a particular person or persons being examined," whereas objective strains are "events and conditions that are disliked by most people in a given group"(Agnew, 2006, p. 170). Subjective strains are more closely linked to criminal behavior (Agnew, 2009). The FA hypothesis stipulates that not all individuals resort to lethal violence as a result of strain; similarly, not all individuals evaluate objective strains as negative (Froggio & Agnew, 2007). In the context of the current research, subjective and objective strains are assessed through the notions of individual-level and aggregate-level strains. Macro-level strains are more persistent in nature (e.g., inequality, poverty), while individual-level strains reflect individual life experiences and can be more situational in nature. Because it focuses solely on crimes against others and neglects suicide, GST offers an incomplete picture of the consequences of strain on violence. Since the current research is investigating violence as a stream of lethality, including both homicide and suicide, the scope of GST requires adjustment for the current framework.

6.5 *Strain Theory of Suicide*

With the exception of Durkheim's writings on suicide and the FA hypothesis, there is not an abundance of macro-level theories of suicide given that this phenomenon tends to be studied at the individual-level, mostly in psychology or health-related fields. The strain theory of suicide is a micro-level theory that is useful in comparing and contrasting homicide and suicide dynamics. Attempts to better understand aggregate patterns of suicide cannot ignore processes that occur at the individual level, given that suicide is strongly linked to psychological issues.

Influenced by Durkheim, GST, and the FA hypothesis, the strain theory of suicide focuses specifically on suicide as a possible outcome of strain (Stack & Wasserman, 2007; Zhang, 2005; Zhang & Song, 2006; Zhang, Wieczorek, Conwell, & Tu, 2011). The theory posits that rivaling stressors/strains lead to psychological discomfort and sometimes to suicidal behavior (Stack & Wasserman, 2007). Similar to the FA hypothesis, the strain theory of suicide highlights the influence of cognitive dissonance, or the idea that individuals may have conflicting ideas or values. Cognitive dissonance is particularly influential when a person's behavior is inconsistent with his or her self-image. Strain may have a stronger psychological impact when compared to cognitive dissonance. Not all stressors negatively impact individuals, and mental disorders may further strengthen the relationship between strain and suicide (Zhang, Dong, Delprino, & Zhou, 2009).

In traditional strain theories (e.g., Merton, 1938 and Agnew, 1992), suicide is overlooked because it is generally outside the scope of the criminal justice system. The strain theory of suicide argues that strains are not exclusively related to economic factors, as suggested by Merton but that they are rather the result of the discrepancy between aspiration and reality, between one's status and that of others, and between crisis and coping abilities. According to Zhang et al. (2011), there are four sources of strain: 1) differential values (i.e., conflicting social values/beliefs); 2) reality versus aspiration (i.e., unattainable goals); 3) relative deprivation (i.e., inequality or perceived relative poverty); and 4) deficient coping (i.e., inability to cope with difficult events). Suicide is an extreme reaction to strain and is said to be particularly linked to the level of aspiration and coping issues (Zhang & Lester, 2008). While these types of strains can only be measured at the individual level, existing data prevent us from investigating the links between these strains and suicide rates.

6.6   *Social Support Theory*

Social support is a frequently used multilevel concept in the criminological literature, popularized in the works of Braithwaite (1989) and Coleman (1990). At the aggregate level, it generally refers to the support and willingness of macro-level units to help others in need (Worrall, 2009). Increased levels of social support may minimize crime because they are related to stronger social control, trust, and cohesion in the form of social bonds (Kim & Pridemore, 2005). While there is no agreed-upon definition, Pridemore and Trent (2010, p. 322) defined social support as "the level of social cohesion within some social aggregate, and it is manifested in numerous ways, including shared values, altruism, and the willingness to aid others." On a macro level (i.e., state or community level), measures of social support generally include welfare, government spending (e.g., education and health), decommodification, and altruism (Nivette, 2011). Chamlin and Cochran (1997) suggested that social support should not only be measured in terms of macro-level financial support to individuals, but also individual-level values, such as trust and empathy. Social support is said to be negatively associated with crime and violence because it reduces the potentially harmful effects of strains (Chamlin & Cochran, 1997).

At the individual level, social support has been defined as "…an individual's receiving or anticipating instrumental and/or expressive provisions supplied by others. It also means having intimate, personal relationships through social networks made up of other people with whom he or she interacts" (Jang & Lyons, 2006, pp. 253-254). For example, support from conventional others, such as family, is a conditioning factor that leads individuals to choose conventional over deviant coping strategies (see also Hirschi, 2009). The relationship between social support and

suicide has traditionally been measured at the micro level.

6.7   *Summary*

As more scholars call for multilevel analyses of large scale phenomena, the integration of theories from different disciplines and levels of analysis has the potential to provide a more thorough understanding of variations in homicide and suicide rates. The theories presented in this chapter (i.e., FA hypothesis, GST, strain theory of suicide, and social support theory) offer an integrated framework to explain the processes underlying violence, at both national and individual levels. The frustration-aggression hypothesis complements key concepts in strain theory. Both frameworks argue that aggression or crime is the outcome of strains or frustrations, with strain theory adding that the relationship between strain and crime/suicide is mediated by negative affect. These theories can be integrated with social support theory, based on the argument that macro- and micro-level social support moderate the relationship between strains/frustrations and violence. Because the underlying notion is strain, there is often overlap between the theoretical predictors of both homicide and suicide rates. This dissertation integrates ideas from these different theoretical paradigms in order to develop a more comprehensive explanatory framework for aggregate violence rates.

Chapter 3: Review of Prior Research on Lethal Violence

7.1   *Introduction*

Despite the significant influence of Durkheim in the social sciences, research on the relationship between homicide and suicide, as well as their common predictors, has been scarce. Most of the literature investigating both phenomena focuses on incidents involving both homicide and suicide. These incidents are measured at the individual level and cannot easily be studied at the national level, much less on a cross-national level. Given that it is difficult to make aggregate inferences about these specific types of lethal events, the homicide-suicide link must necessarily be studied at the macro level. Homicide and suicide are studied through distinct empirical lenses. Homicide requires criminal justice responses while suicide is largely a public health concern (with the exception of nations where suicide is a criminal offense). These divergent fields tend to generate empirical findings that may be difficult to connect at times. Most macro investigations draw on Durkheim's work, as well as different versions of the frustration-aggression hypothesis. Nevertheless, the literature on correlates between homicide and suicide is vast and of varying methodological rigor. Because there is a lack of data and consensus on the operationalization of many key constructs in violence research, scholars tend to use different measures to capture similar concepts, rendering any review of this literature complex and leading to many uncertainties regarding the potential for generalization (Koeppel et al., 2013). The literature review presented in this chapter discusses findings of studies investigating homicide, or suicide, or both, at individual and aggregate levels, with a particular emphasis on studies that have integrated indicators relevant to the FA hypothesis and strain theories.

7.2   *Economic Factors*

The alleged relationship between economic deprivation (i.e., relative and absolute deprivation) and violence stems from many theoretical traditions (e.g., anomie, strain, social disorganization, and conflict theories), and is a recurring predictor in macro-level violence research. Economic deprivation, or macro-level strain, has been explored by using both inequality and poverty as proxies for the "…degree of economic hardship experienced by a social aggregate" (T C Pratt & Cullen, 2005, p. 392). The relationship between economic deprivation and violence tends to be analyzed at the macro level, but it seems more relevant to examine this relationship across different levels. Feelings of frustration are experienced at the individual level, while crime/violence rates are measured at the aggregate or macro level.

7.2.1   *Relative Deprivation: Economic Inequality*

As one of the most recurring variables in cross-national research, economic inequality is generally associated with increases in homicide rates (see meta-analyses by Pratt & Cullen, 2005; Nivette, 2011). However, in a review of 65 cross-national homicide studies, Pridemore and Trent (2010) noted the difficulty in comparing findings across nations. A measure of relative deprivation (i.e., inequality) was included in most studies (N=49), with mostly positive associations with homicide (N= 36). Negative associations were rare (N=2), while null findings were slightly more common (N=11). Other researchers have also failed to find a significant relationship between relative deprivation and lethal violence rates (Barber, 2006; Bennett, 1991; He et al., 2003; Huang, 1995; Jensen, 2006; S F Messner & Rosenfeld, 1997; Neumayer, 2003; Savolainen, 2000).

Explanations for these divergent findings include the possibility of a spurious relationship between inequality and cross-national homicide rates (Neumayer, 2003), model

misspecifications (Pridemore, 2008; Pridemore & Trent, 2010), and inconsistent application of indicators (i.e., Ray and Singer's index of concentration; Huang, 1995; Bennett, 1991). In addition, inequality cannot be fully explained by macro-level processes, and it may be linked to individual-level frustration (Pridemore, 2008). It may also be that inequality is more strongly associated with property crimes (Chamlin & Cochran, 1997; Sun, Chu, & Sung, 2011) than with lethal violence. In order to better understand the role of inequality in the explanation of lethal violence, it is important to explore the multilevel effects of relative deprivation.

The link between inequality and suicide has not been investigated as extensively as the relationship between inequality and homicide. Some studies have found an inverse relationship between inequality and cross-national suicide rates (Chon, 2013; He et al., 2003; Matsubayashi & Ueda, 2011; Shah & Bhandarkar, 2011; Unnithan et al., 1994). This dissertation draws heavily on the work of Unnithan et al. (1994), who offered the following explanation for the inverse association between inequality and suicide rates: for nations where suicide is the more prevalent method of violence, people tend to blame themselves for bad situations; there is generally less economic inequality and a high level of development (Unnithan et al., 1994). Similar to homicide studies, the methodology and sample sizes vary greatly. Inequality has been linked to higher suicide rates in samples of developed nations (Fernquist, 2002) and over time in Eastern Asia (Inagaki, 2010; Yi-Sheng & Ming-Chang, 2013). These findings indicate that the link between inequality and suicide may be dependent on level of development/income, which can be partially explained by the finding that suicide risk tends to increase with age. In nations with high inequality, inadequate nutrition and healthcare may result in lower life expectancy; fewer individuals reach old age, a period of the life course in which the risk of suicide typically

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increases (Shah, 2012; Shah & Bhandarkar, 2011). Conversely, in highly developed nations with low inequality, life expectancy is typically higher, thus potentially increasing suicide risk.

7.2.2   *Absolute Deprivation: Poverty, Development, and Unemployment*

Poverty. Drawing on the work of Marx and Engels (Marx & Engels, 2002), absolute deprivation refers to the idea that the poor and oppressed experience criminogenic conditions (Krahn, Hartnagel, & Gartrell, 1986). Pratt and Cullen (2005, p. 411) note that "… absolute deprivation may also lead to crime indirectly as members of the poverty-stricken groups may eventually come to question the validity of the social arrangement they have been handed." Absolute deprivation is a strong predictor of crime (see meta-analysis by T C Pratt & Cullen, 2005). Because of the lack of appropriate measures, development (i.e., a nation's economic growth), rather than poverty, has been used as a proxy for absolute deprivation on a cross-national level, operationalized as Gross Domestic Product per capita (GDP; Chon, 2013; Loureiro & Silva, 2012), or GDP growth rate (Lederman, Loayza, & Mendendez, 2002; Neumayer, 2003). Nivette's meta-analysis of 37 studies (2011) suggested that despite the fact that cross-national studies frequently include a measure of economic development, this variable is a poor predictor of homicide rates (see also Bennett, 1991). Koepple et al.'s (2013) literature review found that only 4 out of approximately 20 studies published between 1997 and 2011 found a significant relationship between GDP and homicide rates.

A related measure is the Human Development Index (HDI), which is not a measure of absolute deprivation per se, but rather a comprehensive measure of economic and societal development. HDI consists of several items, including life expectancy at birth, education index, and GNI per capita. This index has been associated with lower homicide rates (Altheimer, 2008;

Antonaccio & Tittle, 2007; Loureiro & Silva, 2012), though some studies have not found a

significant association between HDI and homicide (Pratt & Godsey, 2002; 2003). Using data on

a diverse sample of 165 UN member nations, Ouimet (2012) argued that bivariate relationships

between homicide rates and various indicators vary with the HDI level (i.e., low, average, or

high). For the full sample (N=165), nearly all variables (i.e., GNI per capita, Gini, poverty,

proportion 15-29, ethnic heterogeneity, full democracy, and violent conflict) were significantly

correlated. In nations with low levels of HDI (N=44), none of the variables were significantly

correlated with the homicide rate. In nations with a medium level of HDI (N=75), Gini, ethnic

heterogeneity, and authoritarian regimes were significantly correlated with homicide rates. In

nations with a high level of HDI (N=46), only GNI per capita and Gini were significantly

associated with homicide rates. Similar findings emerged from the multivariate analyses.

Ouimet's (2012) study highlights a key issue in cross-national homicide research: significant

effects may be an artefact of samples consisting mostly of highly developed nations, and many

indicators commonly included in cross-national comparisons may not be as influential in less

developed nations. These observations underline the need to further investigate the factors that

may impact homicide rates in developing nations.

The link between poverty and suicide is multilevel in nature. Although poverty is not

consistently included in cross-national suicide studies, it has been associated with increased

suicide rates based on the assumption that poverty causes psychological distress (Stack, 1982;

Stack, 2000) or lower cognitive functions (Mani, Mullainathan, Shafir, & Zhao, 2013), which

may be associated with increased risks for suicide at the aggregate level. Conversely, Durkheim

proposed that there is a protective and restraining quality of poverty on suicide rates. Poor

individuals, Durkheim argued, are less affected by anomic currents and do not have insatiable

desires, and these are the alleged causes of suicide (Durkheim, 1951[1897]). A longitudinal US-based study failed to find a significant association between economic factors (i.e., income and unemployment rate) and suicide rates, although income was negatively associated with spatial variations in suicide rates (Phillips, 2013). Calling into question Durkheim's poverty-suicide argument, a temporospatial analysis of Brazilian regions revealed that both wealthier and poorer areas were linked to higher suicide rates (Bando, Brunoni, Benseñor, & Lotufo, 2012). The evidence on the relationship between relative and absolute deprivation and suicide is mixed, and many are nation-specific. A recent review of the literature (Iemmi, Coast, Leone, & McDaid, 2011) found that 17 out of 21 papers revealed an "unclear association" between relative poverty (typically measured by socioeconomic status) and suicide rates. The relationship between poverty and suicide rates is complex and may be dependent on a number of other variables, such as culture and gender. For instance, a Canadian study noted that the positive relationship between economic factors (such as unemployment and GDP) and suicide rates was stronger among men (Pierard & Grootendorst, 2014).

   Development. Similar to homicide research, economic development has also been utilized as a measure of deprivation in suicide studies. Unnithan et al. (1994) reported negative associations between economic development and suicide rates (for similar findings see Fernquist, 2002; Chon, 2013; Matsubayashi & Ueda, 2011; Okada et al., 2013), as well as economic development and SHR (He et al., 2003; Unnithan et al., 1994), suggesting that higher levels of development (i.e., economic well-being) are linked to lower suicide rates. These findings contradict Durkheim's hypothesis stipulating that wealthier and more developed nations are inevitably more anomic and characterized by higher rates of suicide. The relationship between development and suicide rates may also be driven by other variables. The interpretation of results

may be confounded by the fact that the level of development is not a direct measure of poverty. GDP is not always an adequate indicator of poverty, as some nations have both high GDP and poverty rates. For example, the U.S. has one of the highest levels of development in the world (United Nations Development Programme, 2011), but has also been characterized by a relatively high poverty rate of 15 percent in recent years (United States Census Bureau, 2013).

Several theories have linked unemployment to crime and violence, such as routine activities theory, social disorganization theory, and strain theory. Unemployment has been regarded as an indicator of absolute deprivation at the aggregate level (Krohn, 1976; McDonald, 1976; Neapolitan, 1994) as well as an indicator of economic fluctuation (Neumayer, 2004). Findings on unemployment and homicide have been mixed. Huang (2001) found that unemployment was associated with increased homicide rates in analyses using United Nations Crime Survey and Interpol data, but not with WHO data. One reason for this discrepancy may be the diverse sources underlying these data. UNCS draws on data from both criminal justice and public health sources, Interpol employs criminal justice data, and the WHO draws upon public health data. However, a number of studies have found weak or null effects of unemployment on homicide rates (Lim, Bond, & Bond, 2005; McCall & Nieuwbeerta, 2007; Nivette, 2011). Unemployment has been found to be a significant predictor of suicide (Andrés, 2005; Inagaki, 2010; Johansson & Sundquist, 1997; Noh, 2009; Yi-Sheng & Ming-Chang, 2013), and to be more strongly related to suicide than homicide (Yang & Lester, 1992). However, the relationship between unemployment and suicide may be dependent on level of development (Neumayer, 2004; Noh, 2009). Using longitudinal data for 24 OECD nations, Noh (2009) found that unemployment rates were positively associated with male, female, and total suicide rates, and that the association between unemployment and suicide varied with a nation's level of GDP

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(Noh, 2009). Neumayer (2004) noted in his study on mortality rates (e.g., homicide, suicide, and accidents) in Germany that higher unemployment rates actually lead to lower suicide rates. While this study was methodologically rigorous, it is unclear whether these findings are generalizable to other nations because Germany is a highly developed nation (Gerdtham & Ruhm, 2006). Gerdtham and Ruhm (2006) have argued that the protective effects of the economy on suicide are weaker in nations with strong social safety nets.

One key question in studying the link between unemployment and violence is whether the former exerts an impact on the overall population, or rather has targeted effects on those individuals who are directly affected. The association between unemployment and crime/violence appears to be weak at the macro-level, but more research is needed to explore potential multilevel effects. The frustration-aggression hypothesis argues that unemployment may be related to violence at the individual-level, particularly suicide; individuals may become frustrated from the lack of employment and subsequently blame themselves for loss of employment, resulting in suicide. It is thus crucial to distinguish the effects of individual employment and aggregate unemployment rates on lethal violence.

Overall, economic deprivation is strongly linked to lethal violence. It has been suggested that poverty may exert stronger effects on homicide than income inequality (S F Messner, Raffalovich, & Sutton, 2010; Pridemore, 2008, 2011; Rogers & Pridemore, 2013). At the same time, Pridemore and Trent conclude in their literature review that "whether the operant mechanism is inequality or poverty, it does appear that some form of resource deprivation is a consistent predictor of cross-national homicide rates" (2010, p. 320).

Despite these findings, different empirical patterns emerge for homicide and suicide; homicide rates tend to be linked to higher levels of inequality and poverty, while suicide rates

tend to be associated with lower levels of inequality and poverty. This is inconsistent with the FA hypothesis and the stream analogy of violence. Strains, such as economic deprivation, may cause increases in overall lethal violence, though the few stream analogy studies to date have found very mixed results to support this proposition (Chon, 2013; Fernquist, 2002; Unnithan et al., 1994). This dissertation aims to explore the multilevel relationships that potentially exist between economic factors and lethal violence by exploring the mediating role of individual-level frustration.

7.3   *Social Support*

Macro-level social support measures reflect the extent to which the government offers support to its citizens; it has been found to be a strong predictor of crime (see meta-analysis by Pratt & Cullen, 2005 & review by Pridemore & Trent, 2010), lending support to the idea that social support protects against homicide. Social support is often examined in the context of inequality (Batton & Jensen, 2002; Bjerregaard & Cochran, 2008; T C Pratt & Godsey, 2003; Savolainen, 2000), suggesting that social support may attenuate the effects of inequality on homicide rates. Rogers and Pridemore (2013) found significant interaction effects between poverty (infant mortality rate) and a more comprehensive measure of social support, indicating a buffer effect of poverty on homicide. On the contrary, using a limited sample of 46 nations, Pratt and Godsey (2002) found that social support had a negative interaction effect with inequality. In line with these findings, some authors have argued for the relevance of a multidimensional measure of social support (Altheimer, 2008; Nivette, 2011; Rogers & Pridemore, 2013). Direct effects of social support in general may reduce homicide rates but the role of social support as a moderator is less clear, potentially as a result of the diverse measurements of social

support employed in past research (Koeppel et al., 2013). Social trust has been associated with lower homicide rates (Lim et al., 2005) and with lower suicide rates in Europe (Kelly, Davoren, Mhaoláin, Breen, & Casey, 2009) and in males in Japan (Okamoto, Kawakami, Kido, & Sakurai, 2013). Lim, Bond, and Bond (2005) found that individual-level trust partially mediates the relationship between economic development and homicide rate, and that lower trust levels were associated with higher homicide rates (see also Lederman et al., 2002). Macro- and micro-level measures of social support appear to have similar reductive effects on lethal violence; higher levels of trust appear to protect against the negative effects of lower levels of development. However, the link between social trust and suicide has not been adequately explored in non-Western settings.

There is limited research on the link between macro-level social support and suicide. Social welfare expenditures have been linked to higher suicide rates (Matsubayashi & Ueda, 2011). Noh (2009) found that two types of social support (i.e., the size of expenditures for the unemployed and for the old) were associated with lower suicide rates, suggesting that social support exerts a protective effect on suicide (similar to the effect on homicide). However, both above studies only included developed nations (i.e., OECD nations). At the micro level, it has been suggested that social capital has positive effects on mental health (Kelly et al., 2009). Social support and social control are closely related in that both regulate levels of violence, and it may be argued that social support is similar to social control applied at the macro level. However, while social support is almost exclusively related to lower homicide rates, social control factors (e.g., marriage and religion) may actually be linked to higher homicide rates.

7.4   *Social Control*

Quality of Governance. Quality of governance has been tied to aggregate levels of violence. Cole and Gramejo (2009) found that a lower quality of governance (i.e., WGI index) increased homicide rates. They argued that the quality of governance is an indicator of the level of function of societal institutions, emphasizing the role of institutions in explaining variation in homicide rates (Cole & Gramajo, 2009).

Some studies have examined the relationship between violence and particular types of governance, such as democracy. Democracy has been found to be positively associated with homicide rates (Krahn et al., 1986), which conflicts with the FA hypothesis. Some studies have found that democracy is negatively associated with homicide rates (Lin, 2007; Stamatel, 2009). However, Nivette (2011) found democracy to be a weak predictor of homicide rates. This finding is likely the result of the difficulty in capturing the complex long-term processes of democracy. For example, Neumayer (2003) and Ouimet (2012) found that the relationship between democracy and homicide rates is non-linear. As nations transition from autocracy to democracy, homicide rates initially increase but then decrease (see also Lafree & Tseloni, 2006). Jensen (Jensen, 2006) also suggested that recently established governments lead to increased homicide rates. In short, , the alleged "protective" effects of democracy on violent crime are unclear as levels of violence crime continue to increase in democratic nations (Karstedt, 2006). Karstedt (2006, p. 50) notes:

> Democracies represent an institutional framework and a way of life that is, almost by definition, nonviolent. Contrasting with this ideal are two simultaneous global trends: an extension of democratic regimes and rising levels of violent crime.

Drawing on UN homicide data from 2004 (N=183), Chu and Tusalem (2013) examined the effects of various indicators, including those measuring the role of the state. In the full model with political stability (N=127), logged population size, male-to-female ratio, and logged GNP were negatively associated with homicide rates while Gini, ethnic fractionalization, existence of the death penalty, and political instability were positively related to homicide rates. This model explained 68.1 percent of the variability in homicide rates. Largely similar results were found in the full model with regime type (N=124). Consistent with observations emerging from prior research, Chu and Tusalem's (2013) findings highlight the non-linear relationship (i.e., curvilinear) between the state and homicide rates. Strong democracies and strong autocracies had lower homicide rates while nations with *anocracies*, which are in political transition, have higher homicide rates. Moreover, nations moving towards autocracy had higher homicide rates while nations moving towards democracy had lower homicide rates.

Research on the links between political systems and suicide rates is less developed. Some research has failed to find a link between political systems (i.e., Democracy or Communism) and suicide rates (Chon, 2013; Lester, 1999), while other research suggested that the Christian Democratic party was negatively associated with suicide rates (Matsubayashi & Ueda, 2011).

Divorce. Various measures of social control (e.g., divorce, education, and religion) have been employed in homicide research. While the effects of social bonds on crime have been widely accepted in micro-level criminological research, findings have been inconsistent in macro-level studies(Nivette, 2011). Divorce may be a possible source of strain and frustration (Agnew, 1992), thus leading to violence as a way of coping. Both divorce rate (He et al., 2003) and divorce-to-marriage ratio in developed nations are associated with greater homicide rates (R Gartner, 1990). Beaulieu and Messner (2010) examined the relationship between divorce rates

and homicide rates in larger U.S. cities between 1960 and 2000. They found that the divorce rate positively predicted homicide rates in the years 1970, 1980, and 2000, net of other factors, although the effects of a family disorganization index were stronger. They further noted the stability in the effects of divorce rates on homicide rates in the US (Beaulieu & Messner, 2010, see also Phillips, 2013). In contrast, a number of scholars have reported null findings in the relationship between divorce and homicide rates (e.g., Bjerregaard & Cochran, 2008; Krahn et al., 1986; Lim et al., 2005). In their review, Pridemore and Trent (2010) reported that of the 12 (out of 65) cross-national studies that included divorce rates in their analyses, six studies found positive associations and six reported null findings.

In FA studies, divorce is regarded as a possible source of frustration, and thus suicide. Seventy-eight percent of all empirical studies on suicide showed a positive relationship between divorce and suicide rates (Stack, 2000), and this association holds for both men and women (Fernquist, 2002; He et al., 2003; Lenzi, Colucci, & Minas, 2012; Okada & Samreth, 2013), in Western (Matsubayashi & Ueda, 2011) as well as in Eastern nations like Taiwan (Yi-Sheng & Ming-Chang, 2013). Consistent with Durkheim's argument, divorce may have a greater effect on male suicides because men stand to gain more from marriage (Chen, Choi, Mori, Sawada, & Sugano, 2012). From a micro-level suicide perspective, social control theory posits that individuals with weak attachments to other individuals and social institutions pose a higher risk for suicide (Stack & Kposowa, 2011), and those who have never been married display more suicidal behaviors (Nock et al., 2008).

Incarceration rate. Imprisonment rates have been used as a proxy for punitiveness (Neapolitan, 2001; Young & Brown, 1993). Theoretically, higher incarceration rates are connected to higher crime rates in two manners. First, offenders who are incapacitated are unable

to commit more crimes. Second, due to deterrence effects, individuals are less likely to commit crime because of the threat of punishment; this is also called *the incapacitation effect* (Levitt, 2004). In the U.S. particularly, incapacitation has been linked to changes in the homicide rate through complex processes (Blumstein & Rosenfeld, 1998). On a cross-national level, imprisonment rates and homicide rates have been known to vary together (T C Pratt & Godsey, 2003). Examining the relationship in a different manner, Neapolitan (2001) found that higher homicide rates led to higher imprisonment rates. This relationship was found to be highly reliant on regional effects; despite their high homicide rates, some less developed nations may be more likely to rely on alternatives to imprisonment due to government financial strains and cultural values (Neapolitan, 2001). Thus, the criminal justice system exerts another type of social control by punishing those who break the law (Foucault, 1977), while incarceration directly and indirectly deters individuals from engaging in criminal behavior.

   Female labor force participation. Female labor force participation is related to social control in that it indicates increased maternal absence from the household, which can be a source of frustration. In cross-national comparisons, the percentage of female labor force participation has been associated with increased rates of homicide (Fiala & LaFree, 1988; R Gartner, 1990; Rosemary Gartner, 1991; Rosemary Gartner, Baker, & Pampel, 1990; Neumayer, 2003) and suicide (Fernquist, 2002; Lester, 1988; Yang & Lester, 1988). Conversely, the negative relationship between female labor force participation and suicide rates has been explained by role accumulation, suggesting that more women in the workforce leads to higher incomes and stronger social integration outside the home (Chen et al., 2012). Others have found that female labor participation is not associated with female suicide rates (Matsubayashi & Ueda, 2011) or homicide rates (Bennett, 1991). Most of the research suggests a positive relationship between

female labor participation and homicide, but the net effect of this variable on suicide rates is unclear (Chen et al., 2012).

Religion and religiosity. Durkheim investigated the relationship between religion and suicide and homicide. While the effects of religion on homicide rates have not been thoroughly investigated on a cross-national level, a few scholars have noted the complexity of this relationship (Fernquist, 2002; Jensen, 2006; Maume & Lee, 2003; Whitt et al., 1972). However, U.S. studies, particularly those focusing on the Southern subculture of violence, have long examined the effects of religion on violence. Further, religion is likely to be closely tied to political qualities of a given nation; for example, in Islamic countries, there is no separation between political ruling and religion.

On a macro level, Maume and Lee (2003) found that adherence to religious denominations is associated with reduced homicide rates. Conversely, Fernquist (2002) found that the number of religious books published and the percentage of Christians in a given nation were positively associated with homicide rates. It has also been argued that religion is an indicator of culture. The role of religion has been central to exploring the violence in the American South, as it has a particularly strong basis in this region. Using U.S. data from 1980, Ellison et al. (2003) found a negative association between church membership and homicide rates but a positive link for conservative Protestant membership (the latter relationship found only in the South). Similarly, Lee (2006) found that factors including total Christian adherence rate, civically engaged adherents, and churches per 1,000 people were all linked to lower violent crime rates (homicide, robbery, and aggravated assault) in rural U.S. counties (see also Weaver, Martin, & Petee, 2004). These findings suggest that churches play an important role, and that "they provide a forum through which social networks are developed, social norms are conveyed,

and social capital is built" (Lee, 2006, p. 320). Strong community institutions appear to lead to improved social organization. On the other hand, the density of conservative/evangelical Protestants was linked to increased violent crime rates (Weaver et al., 2004). For example, crime in the U.S. have been measured through factors including religious adherence rates (i.e., Catholic, Jewish, Muslim, Evangelical Christian, and Mainline Christian), percentage of registered Republicans, and net immigration. Esmail, Penny, and Eargle (2013) found that only Catholic adherence was negatively associated with crime rates (i.e., total crime, violent crime, and property crime). Adherence to mainline Christian and Catholicism led to reductions in the violent crime rate while adherence to Muslim and Jewish faith led to increases in the violent crime rate (Esmail, Penny, & Eargle, 2013).

Outside of the U.S., Antonnacio and Tittle (2007) found that nations with a predominance of Eastern religions (e.g., Islam and Hinduism) had significantly lower homicide rates than non-Eastern religions (see also Neapolitan, 1997; Chu & Tusalem, 2013). It may be that Muslim nations are characterized by a strong sense of community, which exerts strong social control, ultimately deterring people from engaging in crime (Neapolitan, 1997; Neumayer, 2003). Several scholars have reported that religion acts as a protective factor against suicide (Morselli, [1879]1882; Stack, 2000), as well as against suicide attempts (Sisask et al., 2010). The number of religious books published, as indicative of strong religious influence, was found to be negatively associated with suicide rate (Fernquist, 2002). This finding supports the idea that religion has a protective quality against suicide, specifically in societies characterized by high levels of religiosity (Burr, McCall, & Powell-Griner, 1994; Faupel, Kowalski, & Starr, 1987; Helliwell, 2007; Simpson & Conklin, 1989; Stack & Kposowa, 2011) or strong religious engagement (Stack & Kposowa, 2011). Using aggregated WVS data from 1990-1993, Jensen

(2003) found factors relating to belonging to a religion were associated with lower rates of both homicide and suicide. A high degree of passion for a religion, more linked to fundamentalist beliefs, was associated with higher homicide rates but lower suicide rates. Jensen (2003) argued that these links are related to "good-vs-evil" world views as well as value tolerance and flexibility. Jensen (2006) has also stressed the need to look beyond traditional measures of adherence to a religion and to take into account the nature and intensity of beliefs. He found that "measures that tap intensity and belief in malevolent religious or cosmic forces are more strongly correlated with homicide rates than the measures tapping belonging, attendance, belief in God, and belief in Heaven" (Jensen, 2006, p. 4).

Brauer, Antonaccio, and Tittle (2013) argued that the negative relationship between religion and crime, documented in several U.S.-based studies, is also observed in non-Western and non-Christian settings, namely Ukraine and Bangladesh. Religiosity negatively predicted projected criminal activity, though there were differences between the countries when analyses were run separately (Brauer, Antonaccio, & Tittle, 2013).

In short, religion and religiosity may act as protective factors against lethal violence. For instance, Islam prohibits suicide and condemns lethal violence more generally (Chen et al., 2012; Colucci & Martin, 2008; Pridmore & Pasha, 2004; Rezaeian, 2008); suicide is also a serious sin in Judaism (Colucci & Martin, 2008). Interestingly, Lester (2006) noted that while Muslim nations and individuals are characterized by lower suicide rates, they do not generally display lower rates of attempted suicide. The dark figure of suicide may be more pronounced in countries where this act is regarded as particularly reprehensible. Other religions (e.g., Buddhism, Shinto) have historically been more tolerant of suicide (Colucci & Martin, 2008). In short, the relationship between religion and homicide may vary with the type of religion, while

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religions in general may be protective against suicide. Based on the research reviewed in this section, religion appears to have a greater effect at the individual level, due to the varying levels of attachment to religion across different individuals within a nation. As such, aggregate measures of religion and religiosity may be less likely to influence lethal violence rates.

7.5   *Psychological and Other Individual-level Indicators*

While it is important to map the larger influence of psychopathology on violence in nations of varying level of development, existing official data is inadequate. Some research has suggested that some beliefs, which are central to attribution of blame and the FA hypothesis, are common across cultures (Leung et al., 2002). One of the few studies to include psychological indicators such as emotionality, neuroticism, and fate control, found that these measures were not associated with homicide rates (Lim et al., 2005).

One of the main postulates of general strain theory (GST) relates to the role of negative affect (i.e., emotions) as a mediator between strain and crime (Agnew, 2009; Brezina, 2010). The distinction between trait emotions and state emotions is important. Trait emotions refer to stable recurring emotional patterns, which are often closely related to personality characteristics. State emotions are more malleable and situational in nature. GST stipulates that emotional states, not traits, are associated with criminal behavior (Agnew, 2009). In a mixed-methods study, Slocum et al. (2012) found that feelings of anger, irritation and frustration were the most common emotions leading up to violent incidents among women. Both the FA hypothesis and GST stress the importance of frustrations and other negative emotions in explanations of violence. In an attempt to compare GST and the FA hypothesis, Felson et al. (2012) found that different stressors (e.g., finance, health, and death) were associated with different types of crimes (e.g.,

attacks on property, personal violence). These findings negate the premise of the frustration-aggression hypothesis, stating that all frustrations lead to aggression (Felson et al., 2012). However, the authors fail to acknowledge the entire scope of the FA hypothesis, which argues that in most cases, aggression is contained or latent, explaining why most individuals in disadvantaged or oppressive conditions do not turn to violence.

There is a large body of research on the psychological predictors of suicide. A review of these studies is beyond the scope of the present study, but the most common disorders prevalent among suicide victims include schizophrenia, drug dependence, alcohol dependence, personality disorders, and affective disorders (Large, Smith, Swinson, Shaw, & Nielssen, 2008; Nock et al., 2008). Mental disorders (e.g., mood, impulse-control, anxiety, and substance abuse) were strongly related to suicide behaviors (when controlling for known predictors) in both low and high income nations (Nock et al., 2008).

7.6   *Population Characteristics*

Geographic location. Cultural or regional variance in violence is commonly measured through the use of a dummy variable for a specific region (e.g., Barber, 2006), such as Latin America (e.g., Cole & Gramajo, 2009), Eastern Europe (Lafree & Tseloni, 2006), Western nations (T C Pratt & Godsey, 2002), and Asia (Neapolitan, 1998). Nivette (2011) found that the Latin America dummy had the strongest mean effect size in a meta-analysis of homicide studies. These findings highlight the importance of investigating the cultural setting in studies of lethal violence, and reinforce the need to revisit the generalizability of findings emerging from data collected in developed nations.

Gender. Males are more likely to commit homicide (Nivette, 2011) and suicide (Lester, 2000; Matsubayashi & Ueda, 2011; Stack, 1982; Stack, 2000; Stack & Wasserman, 2009) when compared to women. In homicide research, the proportion of males in any given population is typically considered because males are more likely to perpetrate this crime. Sex-ratio has been found to have overall weak effects in prior research (Nivette, 2011). However, a different pattern has emerged in some non-European nations (e.g., Sri Lanka, El Salvador, Cuba; Wasserman et al., 2005). These data have suggested higher suicide rates among women (Wasserman et al., 2005), suggesting that the proposed distribution of suicide rates by gender may not apply to developing nations.

Age. Both homicide and suicide rates may be related to age distribution. The proportion of youth in a population is a strong predictor of cross-national homicide rates (see meta-analysis by Nivette, 2011). Chon (2013) reported lower homicide rates in societies with a higher proportion of the population that is over 65 years of age. Conversely, other studies have noted that this age group is associated with increased risks of suicide (Chon, 2013; Lenzi et al., 2012; Noh, 2009; Shah, 2011; Stack, 2000). In developed nations, the average male suicide rate for individuals over 65 years of age is almost twice that of the total male average suicide rate (Matsubayashi & Ueda, 2011), highlighting the age-graded suicide risk. Interestingly, older individuals tend to disapprove of suicide more than their younger counterparts (Stack & Kposowa, 2011). Drawing on data from 97 nations, Shah (2012) investigated national suicide rates among specific age-groups (ages 16 and up, split into seven groups) and challenged some of the consistent findings about age and suicide risk. In most nations, there was no increase in suicide rates with age. In three regions (i.e., South/Central America, the Caribbean, Eastern European, and ex-Soviet Union countries), where there was no relationship between increased age and suicide rates, there

was also a low overall suicide rate, peaking in younger years (Shah, 2012). These findings underline the need to further investigate the impact of age on suicide in different cultural settings given that the age-violence association may be less salient in some cultural contexts.

7.7   *Summary*

In reviewing the literature on the predictors of homicide and suicide rates, some patterns emerge. Some predictors appear to have distinctly opposite effects on the two types of violence, specifically the strain variables. For example, income inequality is associated with increased homicide rates and lower suicide rates. Other variables, such as female labor force participation and divorce, appear to have similar effects on both types of lethal violence. The FA hypothesis argues that residual aggression is regulated by different forces of social control. Therefore, we would expect measures of social control to have similar effects on homicide, suicide and lethal violence rates. We know little about how individual-level variables interact with macro-level measures to impact lethal violence rates. The analyses conducted in this dissertation will shed some light on this issue.

Chapter 4: Data and Methods

8.1   *The Current Study*

This chapter provides an overview of the sample, data sources, variables, measurement issues, analyses, and research questions pertinent to the current study. Homicide and suicide data are known to have some limitations, ranging from measurement to missing values. These issues, as well as strategies to remediate the limitations, will be thoroughly discussed in this chapter. This dissertation aims to investigate the effects of strain, frustrations, negative affect, and the potentially moderating effect of social support through economic deprivation on various measures of violence, namely homicide rates, suicide rates, suicide-to-homicide ratio (SHR), and lethal violence rate (LVR), while controlling for theoretically relevant variables (e.g., economic indicators, population characteristics, and social control). Frustration has been inadequately measured outside of the experimental-psychology literature, in part due to the lack of consensus regarding its definition; this study seeks to create a valid and reliable measure of frustration. Separate analyses will be conducted for each form of violence in order to investigate whether the predictors of homicide and suicide are similar and whether these two phenomena reflect a single stream of violence. Results for different expressions of lethal violence will be compared.

The need for multilevel models has been expressed in both the homicide (Elgar & Aitken, 2011; Koeppel et al., 2013) and suicide literatures (Stack & Kposowa, 2011). For example, we know very little about the effects of macro-level processes on individual-level outcomes (Stack, 2000; Stack & Kposowa, 2011). Aside from self-reported surveys on non-lethal violence, to my knowledge, past research has failed to conduct macro-micro investigations of violence on a global scope.

Given that this research is cross-sectional in nature, temporal issues are inherently present. Data are not available to establish temporal links and exact causal mechanisms in cross-national comparisons of strains, frustration/negative affect and violence. Even with adequate data, these highly complex cause-and-effect relationships are difficult to ascertain, partly because of the situational character of aggression. To the extent possible, the independent variables have at least a one year time lag from the dependent variables. Multilevel structural equation modeling (MSEM) analyses will also offset some of these issues.

This dissertation draws upon several theories to examine different aspects of the proposed relationship between strain/frustration and lethal violence. To summarize the main points of each theory, the FA hypothesis suggests that frustration causes aggression, which, if not properly managed, could be expressed in the form of a crime or, in the most extreme scenario, lethal violence. While proposing similar but more specific mechanisms, GST further expands on the potentially mediating effect of negative affect in the relationship between strain and crime. The strain theory of suicide, which stipulates that suicide is the outlet for strain, creates a bridge between suicide and GST. Though it was not intended as a theoretical model, the stream analogy model takes into account both psychological and sociological factors that may lead to violence, which is a useful framework in multilevel analyses. The current study examines four main research questions, which are listed in table 1 below.

Table 1. Research Questions and Hypotheses for Lethal Violence

	Macro-level hypotheses	Multilevel hypotheses
RQ1: Within the FA framework and drawing on strain theories, how do multilevel strain factors influence national homicide rates in a cross-national sample?	Higher levels of <u>macro strain</u> are associated with higher homicide rates, irrespective of the level of development and controlling for social controls. The relationship between strain and homicide rates is attenuated by welfare.	At the national level, higher levels of <u>micro strain</u> are associated with higher homicide rates, net of the effects of social controls. The relationship between micro strain and homicide rates is <u>mediated</u> by aggregate-level frustration and <u>moderated</u> by trust. At the national level, higher levels of <u>macro strain</u> lead to higher homicide rates, net of effects of social control and control variables. The relationship between macro strain and homicide rates is <u>mediated</u> by aggregate-level frustration and <u>moderated</u> by welfare.
RQ2: Within the FA framework and drawing on strain theories, how do multilevel strain factors influence national suicide rates in a cross-national sample?	Higher levels of <u>macro strain</u> lead to higher levels of suicide rates regardless of level of development, net of effects of social control, and controls. The relationship between strain and suicide rates is attenuated by welfare.	At the national level, higher levels of <u>micro strain</u> are associated with higher suicide rates, net of the effects of social controls. The relationship between micro strain and suicide rates is <u>mediated</u> by aggregate-level frustration and moderated by trust.
RQ3: Within the FA framework and drawing on strain theories, how do multilevel strain factors influence suicide-homicide ratios (SHR) and lethal violence rates (LVR) in a cross-national sample?	Higher levels of <u>macro strain</u> lead to higher levels LVR regardless of level of development, net of effects of social control and control variables. The relationship between strain and LVR is attenuated by welfare. SHR is not related to macro strain.	At the national level, higher levels of <u>micro strain</u> are associated with higher LVR, net of the effects of social controls. The relationship between micro strain and LVR is <u>mediated</u> by aggregate-level frustration and <u>moderated</u> by trust. SHR is not related to micro strain.

8.2   *Data*

The macro-level variables come from a number of sources, but mostly the UN. Data were collected based on the source with the most complete data available. There are debates regarding the most accurate source of homicide data. Some argue that UN data are more reliable and comprehensive (Bennet & Lynch, 1990), while others suggest using WHO data (Pridemore & Trent, 2010). The UN sample is much larger and may be better suited for statistical analyses. The analyses carried out in this dissertation employed both UN and WHO data and compared results between each source of data.

The individual-level data are drawn from the 5th wave of the WVS (2005-2008), which includes 57 nations and approximately 80,000 individuals. This wave was selected because it was the most recent data available. The sixth wave had not been published at the time of data collection. Waves could not be combined because the items of interest were not repeatedly asked across waves. A list of countries is included in the Appendices (World Values Survey, 2015).Table 2 lists all the dependent and independent variables included in the analyses.

8.2.1   *Macro-level Data Sources*

The majority of data sources included in the macro-level analyses were collected by the United Nations (UN). The UN was formed by 51 countries at the end of World War II in 1945, with the goal of maintaining peace, social progress, good living standards, and human rights. It currently includes 193 member states and can make decisions on behalf of the members on a range of issues through its governing body (2014b). Over the years, the UN has developed several different branches that disseminate statistics on a wide range of topics.

The United Nations Office on Drugs and Crime (UNODC). The United Nations Office on Drugs and Crime (UNODC) was created in 1997 when two other UN programs merged (i.e., the United Nations International Drug Control Program and the Crime Prevention and Criminal Justice Division). The UNODC collect and analyze data to help members develop crime-related policies, but it also focuses on initiatives to prevent and target drugs and international crime, especially terrorism. (United Nations Office on Drugs and Crime, 2014a). Published by the UNODC, the United Nations Surveys on Crime Trends and Operations of Criminal Justice Systems (UNOCTS) is a collection of international crime data, which uses a variety of criminal justice or public health data with the purpose of disseminating data worldwide. Crime data originate from a number of sources, both criminal justice and public health sources. The crime data consist of victimization incidents reported to authorities in respective countries. Then national police, national statistical offices, and/or other national authorities submit these data to UNODC. The UN further validates the submitted data by requesting explanations from member states in circumstances when a homicide estimate is 30 percent different from adjacent years (United Nations Office on Drugs and Crime, 2014b).

The World Health Organization (WHO). The World Health Organization is a health-oriented branch of the UN. It publishes mortality data in the WHO Mortality database which is updated annually. The data come from official statistics from civil registration systems given by member states, based on death certificates, which have been signed primarily by medical doctors (and sometimes by police officers). Mortality data are verified to ensure that they were coded with official ICD-codes (International Classification of Diseases). ICD is a standard diagnostic tool and is used to monitor overall incidence and prevalence of diseases and health issues. A more detailed description of these codes can be found in the Appendices (Appendix A). There is

a time lag in accessible data because it generally takes countries 12-18 months after the end of the calendar year to check, compile, and verify data before sending them to the WHO (World Health Organization, 2015d).

Several issues plague the WHO: missing data and underreporting of certain mortality types are the most important ones. Missing data are a significant problem for two reasons: some countries do not report data to the WHO while others submit incorrectly coded data that cannot be reported. Both problems may be more prominent in poorer countries due to inadequate recording systems for causes of death. There may not be enough medically certified professionals who can complete death certificates (World Health Organization, 2012). Lethal violence underreporting to the WHO may be due to the fact that reporting is voluntary (Chon, 2013). As a result, underdeveloped nations tend to be less represented in WHO mortality data (Krahn et al., 1986; S F Messner & Rosenfeld, 1997).

The most commonly used sources for homicide data (i.e., the World Bank, the WHO, and the UN) have proven to be reliable sources for cross-national analyses (Bennett & Lynch, 1990). Despite the mentioned issues with WHO data, homicide data from the WHO are generally regarded as valid and reliable (Lafree & Tseloni, 2006; S F Messner & Rosenfeld, 1997; Neapolitan, 1997). Suicide data, however, are subject to issues that extend beyond missing data. Wasserman, Cheng and Jiang (2005, p. 118-119) argue that "suicides are underreported for cultural and religious reasons, as well as owing to different classification and ascertainment procedures." Eton and colleagues (2006) noted that suicide data may be susceptible to classification bias because suicides may be classified as accidents or undetermined deaths.

*The United Nations Development Programme (UNDP).*Developed in 1966, the United Nations Development Programme (UNDP) exists in 170 countries/territories. They have several

main goals but the most emphasized issues are poverty and inequality reduction. Overall, they stand for human rights and empowerment of women, the poor, minorities, and other vulnerable groups. UNDP helps members by providing aid, such as micro financing in weakly developed countries (United Nations Development Programme, 2014).

The International Labour Organization (ILO). Founded in 1919, the International Labour Organization became part of the UN in 1946. The International Labor Office (ILO) promotes rights related to employment. Their research agenda attempts to increase employment and various related social outcomes as well as encourage global financial well-being. Data target employment and job quality, returns on investment in social security, inequality, instability, international labor standards, and socially inclusive globalization (International Labour Office, 2013).

The World Bank (WB). The World Bank (WB) Group was founded in 1944 by economists John Maynard Keynes and Harry Dexter White. The WB aims to reduce poverty by providing financial and technical help to developing countries. In developing nations, the WB offers low-interest loans, interest-free credit, and grants. By collecting data, the WB can assess where help is needed (World Bank, 2013). The WB publicly distributes data on various economic factors.

Central Intelligence Agency (CIA). Finally, the Central Intelligence Agency's (CIA) World Factbook contains extensive information about countries and territories in the world. While this information is specifically tailored to the needs of U.S. Government Officials, the data are available to the public. Data are gathered from censuses, surveys, and registration systems, but they are not partnered with any organization (Central Intelligence Agency, 2014).

Other Sources. Though these data were not used in the analyses, data on homicide and suicide were collected from other sources. Because these analyses are limited by the given countries in the WVS dataset (discussed below), many of these nations lacked mortality data from the WHO (or the UN for homicide). To address this issue, data were collected from various websites of government and statistical agencies, and through email contacts with key agency officials in different countries. Suicide data were typically difficult to find. If they were not available on a government website, email requests were seldom successful. Developing nations may not prioritize collecting suicide data for a number of reasons, such as financial issues and societal stigma. It was more common to find structural and health statistics for developing nations, which may reflect the national priorities.

8.2.2   *Micro-level data sources*

The World Values Survey Association is a non-profit organization consisting of a network of social scientists generally funded by their respective countries to carry out national surveys. The WVS developed from the European Values Survey which was led by Jan Kerkhof and Ruud de Moor in 1981. The WVS investigates changing values and beliefs in various nations, and explores how these measures impact individual, social and political lives. Each new wave has attempted to be increasingly inclusive of developing and non-Western countries. [3] The WVS has been distributed in more than 100 countries, to over 200,000 individuals, over six waves from 1981 to 2013. This survey has produced a vast database of individual-level data (World Values Survey, 2013). All individual-level data employed in this dissertation are drawn from the WVS.

[3] Wave 1: 1981-84; Wave 2: 1989-93; Wave 3: 1994-98; Wave 4: 1999-04; Wave 5: 2005-08; Wave 6: 2010-12

WVS sampling methods are rigorous. With a minimum sample of 1,000 adults, stratified random sampling strategies are used to ensure that national samples are representative of the population. Professional organizations carry out surveys by face-to-face or phone interviews (in more remote locations). Each country is assigned a Principal Investigator, who ensures that proper procedure is followed. Probability sampling is the preferred method for WVS surveys, although Principal Investigators may sometimes use quota sampling, or a combination of probability and quota sampling with very stringent rules (World Values Survey, 2015).

8.3   *Variables*

8.3.1   *Dependent Variables*

The dependent variables in the present study are different forms of lethal violence: 1) homicide rate, 2) suicide rate, 3) suicide-homicide ratio, and 4) lethal violence rate (LVR). Data were drawn from the UN and the WHO. Lists of nations included in these two samples are in the Appendices.

8.3.1.1   *Homicide Rate*

The first dependent variable is the homicide rate per 100,000 persons in 219 nations, drawn from the most recently updated and complete UN data: *the Global Study on Homicide 2013* (United Nations Office on Drugs and Crime, 2014b). Some countries and territories were excluded due to small population sizes and lack of data on many of the independent variables. After removing these cases, the final sample size was 187 for the years 2000-2012. UNODC defines homicide as "unlawful death purposefully inflicted on a person by another person" (United Nations Office on Drugs and Crime, 2014b). Data were transformed into multiyear

averages for the years 2008-2012. Due to the skewed distribution of homicide rates, the natural

log was applied to homicide rates (see also Elgar, 2011; Sun, Chu & Sung, 2010; Altheimer,

2008).

8.3.1.2 Suicide Rate

The second dependent variable was the suicide rate per 100,000 persons in 108 nations.

These count data were drawn as raw data files from the WHO's mortality database (World

Health Organization, 2015d) between the years 2000-2012. The WHO defines suicide as "the act

of deliberately killing oneself" (World Health Organization, 2015b; ICD-codes X60-X84).

Because the data were counts they were transformed into rates using population data. The WHO

distributes population data in the mortality data file. However, these population data were

missing many values. Instead of combining population data from different sources to adjust for

missing values, data from the WB were used. The following formula was used to create suicide

rates:

Number of suicides/(total population size)*100,000.

Similar to the homicide rate, the suicide rates were further transformed into multi-year

averages for the years 2008 and 2012, and skewness was corrected by taking the natural log of

suicide rates.

8.3.1.3 Suicide-to-homicide ratio (SHR)

The third dependent variable was the suicide-to-homicide ratio (SHR), drawing homicide

and suicide data from the raw data files in the WHO's mortality database between the years 2000

and 2012. In addition to the information about suicide data listed below, the homicide data need further explanation. As per the WHO, assault is defined as "homicide; injuries inflicted by another person with intent to injure or kill, by any means," and this category excludes legal intervention (i.e., injury caused by law enforcement or military) and operations of war (i.e., battle related deaths; ICD-codes: X85-Y09). Identical steps were taken with the homicide data (i.e., transformation of counts to rates using WB population data, combination of the years 2008-2012 into a multiyear average, and natural log transformation due to skewness).

SHR was be calculated by adding multiyear averages of suicide and homicide rates from the WHO data, and then dividing by multiyear average suicide rate. SHR was calculated by the following formula:

$$\text{SHR} = \frac{\text{Suicide rate}}{(\text{Suicide rate} + \text{Homicide rate})}$$

SHR is an indicator of the proportion of suicides over homicides. A proportion or ratio higher than .5 indicates that homicides are more prevalent than suicides. On the contrary, a proportion or ratio lower than .5 shows that suicides are more prevalent over homicides. Because of the uneven distribution of the SHR, it could not be used in its original form. SHR was recoded into a dummy variable based on upper 25th quartile distribution. Cases in the lower 75th quartile were coded 0 and cases in the upper 25th quartile were coded 1. This type of coding ensured that cases with higher SHR were in one category, resulting in more logical interpretation.

8.3.1.4   Lethal violence rate (LVR)

The fourth and final dependent variable was the lethal violence rate (LVR). The same WHO data between the years 2008 and 2012 were used to calculate LVR as used for SHR, and the same transformations were made. LVR was the overall rate of violence. *LVR* was calculated by simply adding multiyear averages for homicide and suicide rates:

$$LVR= \text{Suicide rate} + \text{Homicide rate}$$

8.3.2   *Independent Variables*

Data on all independent variables were gathered between the years 2000 and 2010.

8.3.2.1   Strain

Inequality. Economic inequality is measured through the Gini index. The most recent data dating back as far as 1990 were collected from the UN Development Programme, yielding a sample size of 127. The Gini index is a measure of the degree of inequality in a nation's income distribution (Nivette, 2011), and it is the standard measure of inequality (Pridemore, 2008). The Gini index measures the deviation of the distribution of income or consumption of individuals or households in a country from a perfect equality distribution, with values ranging between 0 and 100. 0 is no deviation and 100 is absolute equality (World Bank, 2013). The Gini index has been found to be reliable and valid (Forbes, 2000; S F Messner, Raffalovich, & Shrock, 2002), as well as temporally stable (Pridemore, 2008). Conversely, Pratt and Godsey (2003) found that the Gini index lacked reliability, produced inconsistent results (S F Messner et al., 2010; Pare & Felson,

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2014), and was subject to irregular reporting by nations (Chon, 2013; Antonaccio & Tittle, 2008; Pridemore, 2008; Chamlin & Cochran, 2006; Messner & Rosenfeld, 1997).

Given the inconsistencies with regards to data availability and findings in the literature, there was some hesitation in using the Gini index. When the Gini was initially tested in the homicide chapter, it proved to be a very inadequate measure for three reasons. First, due the large number of missing values, the Gini was not appropriate to use in multiple imputation (i.e., FMI was .49). Second, regression analyses revealed that the Gini index was extremely sensitive to outliers. Third, when bivariate correlations were computed by region between inequality and homicide rates, the coefficients were distinctly different, both in terms of direction and significance level. This suggests that varies by region and culture, and that it is not an appropriate measure in diverse samples. Based on these observations, the use of the Gini index was discontinued after the weighted least squares models in chapter four.

Poverty. Often used as a proxy for poverty (Dasandi, 2013; Pridemore, 2008), the infant mortality rate is defined as the number infants dying before reaching one year of age, per 1,000 live births. Data were collected between the years 2000 and 2010 from the WB (World Bank, 2013). Originally, these data were developed by a UN Inter-agency group for child mortality estimation (United Nations, 2014a). Messner et al (2010) confirm the construct validity of using infant mortality rate as a proxy for poverty in a smaller Western sample. The infant mortality rate was not normally distributed so it was transformed by taking the natural log.

Income level (drawn from the WVS) was employed as a measure of micro strain related to financial status (but not necessarily poverty). Income level was a continuous measure of an individual's self-reported income level (i.e., ten levels).

Development. Measures of development have been used as an alternative to indicators of poverty. Some have used GDP or GNP but because these variables have generally been found to be poor predictors of violence (Iemmi et al., 2011; Nivette, 2011), it has been argued that a more complex measure is appropriate (Ouimet, 2012). Instead of using a singular measure of development or national income level, analyses included the Human Development Index (HDI) (United Nations Development Programme, 2012). HDI is a composite measure consisting of life expectancy at birth, educational attainment (adult literacy rate), and adjusted real income (GDP per capita). HDI ranges between 0 and 1. Because of issues of multicollinearity with another key variable (i.e., poverty; VIF>10), the HDI was recoded into a dummy variable, using cutoffs determined by the UN (HDI, 2014). A value of 0 corresponded to low/medium level HDI (<.799), and a value of 1 denoted high level HDI(>.800).

Unemployment. Unemployment was measured as a macro and micro strain. Percent unemployed was a measure of macro strain that was collected from the International Labour Organization (ILO). ILO defines percent unemployed as "the percent of the total labor force that is unemployed, but they are available for and looking for employment" (International Labour Office, 2013). A micro measure of unemployment was collected from the WVS dataset. This survey item was recoded into a dummy variable (0: employed; 1: unemployed).

8.3.2.2 Social Support

Welfare. A number of different variables have been employed in prior research to measure social support/capital, such as the Human Development Index (Cao, Zhao, Ling, & Zhao, 2009), decommodification (Altheimer, 2008; Savolainen, 2000; Messner & Rosenfeld, 1997) , health, and education expenditures (Altheimer, 2008; Elgar & Aitken, 2011; T C Pratt &

Godsey, 2002). Social support at the national level was measured by percent of GDP spent on healthcare. The data were collected from the UN Development Programme (United Nations Development Programme, 2014) from 179 nations. Because of the skewed distribution, the welfare variable was transformed using the natural logarithm.

Trust. Many scholars have used WVS data to explore the effects of social support in the form of social capital, as measured by trust (Fukuyama, 2001) and social trust (Halpern, 2001; Johnson & Mislin, 2012; Mikucka & Sarracino, 2014; Newton, 2001). In the analyses carried out in this study, social support at the individual-level was measured through the concept of trust. Factor analyses were conducted on several items related to trust in the WVS dataset. However, an adequate indicator was not identified. As a result, a single dichotomous item measuring trust was employed. The survey question "Most people can be trusted" was recoded into a dummy variable (where 0: no; 1: yes) (Mikucka & Sarracino, 2014; Wang & Gordon, 2011).

8.3.2.3   *Social Control*

This dissertation includes some macro-level measures of social control that are central to crime regulation: quality of governance, religion, female labor participation, divorce, and incarceration rate.

Governance. The WB defines governance as "the traditions and institutions by which authority in a country is exercised, including the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them" (World Bank, 2014). Measures on quality of governance, the World Governance Indicators (WGI), were collected from the WB (World Bank, 2013) for

199 nations. The following indicators were available: 1) voice and accountability; 2) political stability and absence of violence; 3) government effectiveness; 4) regulatory quality; 5) rule of law; and 6) control of corruption. The WGI were created from survey data on governance that were subjective in nature (i.e., perceptions), distributed to households, companies, and experts.

Instead of focusing on a one-dimensional aspect of governmental qualities, such as rule of law, a factor indicator based on the WGI indicators that captures the overall quality of governance was created (Cole & Gramajo, 2009; Langbein & Knack, 2009). Exploratory factor analysis was conducted for each year (2000, 2002-2011). The analyses revealed that the WGI items reflect the same dimension and loaded on one factor. A reliability test on the quality-of-governance factor provided an alpha of .961, suggesting high reliability. A table with details on FA results can be found in the Appendices (Appendix D).

Divorce. While divorce rate was intended to be used in the macro homicide regression and SEM models, this was not possible due to missing data. However, an individual-level measure of marital status from the WVS data was used. The survey question on marital status was categorical and was therefore recoded to a dummy for the analyses. The dummy for divorced/separated was coded such that 0 was not divorced/separated and 1 was divorced or separated.

Religion/religiosity. Religion is measured in a variety of ways in the violence literature, including number of religious books published (Fernquist, 2002), church membership (Stark, 1984), and religion dummies for Christianity, Islam, Hinduism, and Buddhism (Fajnzylber, Lederman, & Loayza, 2002), and Eastern religions (Antonaccio & Tittle, 2007). We collected data on countries in which 90 percent or more of the population adhered to the same religion from the CIA World Factbook (Antonaccio & Tittle, 2007). A dummy variable called mono

religion was created for nations that had 90 percent or more followers of a single religion. 0 was coded not mono religion and 1 was coded mono religion.

At the individual level, the WVS documented information about the level of religiosity. There are numerous items in the WVS dataset on different aspects of religious beliefs and practice; these have been used by various scholars (Jensen, 2006). Survey questions pertaining to religion were included in an exploratory factor analysis in order to identify a more comprehensive measure of religiosity. The analysis produced a religiosity factor consisting of three items: importance of religion, importance of God, and religious attendance. A reliability test on the quality-of-governance factor provided an alpha of .727, suggesting high reliability (see Appendix D).

Female labor participation. Female labor participation was measured by the percentage of women in the population who were in the labor force in a given year. The data were collected from the WB for 178 nations.

Incarceration rate. Prison population rate per 100,000 was obtained from the International Centre for Prison Studies (ICPS) for varying years for 175 nations. Data were not always available for the same year. For the multilevel analyses, most of the data were collected from the 7th edition of the Prison report with years generally varying between 2002 and 2005.[4] The incarceration rate was not normally distributed and log transformed.

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[4] Data were collected from the 6th edition for Ethiopia, Ghana, Iran, Japan, Moldova, Romania, Russia, Serbia, Slovenia, Spain, Sweden, Switzerland, Ukraine, UK, Australia, and New Zealand. For the UK, the rates were only given for England, Northern Ireland, Scotland, and Wales. To get an overall rate for the UK, incarceration counts were added for these regions and a rate was created with total population size. For Rwanda, people held/imprisoned for genocide were not included.

8.3.2.4   Frustration

Frustration is one of the key indicators in this study. Survey questions relating to general well-being were obtained from the WVS (i.e., happiness, feelings of freedom, life satisfaction, and financial satisfaction). The selected items were recoded such that a high score on any of the items reflected a more "negative" or frustrated response. The items were analyzed in an exploratory factor analysis to create a composite indicator. A reliability test on the frustration factor provided an alpha of .670, suggesting a moderate level of reliability (see Appendix E).

8.3.2.5   Population Characteristics

The population/demographic variables were used as control variables because they tend to be influential correlates of violence. The variables were population size (n=186), sex ratio (i.e., number of males per 100 females in population; n=181), and the proportion of youth in the population (15-25 years old; n=181). Population size was used to create homicide and suicide rates. The WHO population sample was small and included many missing values, and thus population characteristics variables were drawn from the WB.

Table 2. Summary of Variables Included in the Analyses

Variables	Definition	Measurement	Source
Dependent Variables			
Homicide rate	Unlawful death purposefully inflicted on a person by another person	Per 100,000 people	UN
	Death by injury purposely inflicted by others (excluding wars)	Per 100,000 people	WHO
Suicide rate	The act of deliberately killing oneself	Per 100,000 people	WHO
Suicide-homicide ratio (SHR)	The ratio of suicides to homicides	Suicide rate/(Suicide rate+ homicide rate)	WHO
Lethal violence rate (LVR)	The combined total of suicide rate and homicide rate	Suicide rate+ homicide rate per 100,000 people	WHO
Independent variables (Macro)			
Gini Index	Deviation of the distribution of income (or consumption) among individuals or households within a country	1-100 (equality→ inequality)	UN Development Programme
Infant mortality rate	Number of infants dying before reaching one year of age	per 1,000 live births	WB
Unemployment	Percent of population unemployed	percent	ILO
HDI dummy	Human Development Index: measures life expectancy at birth, educational attainment (adult literacy rate), and adjusted real income (GDP per capita)	Level of development divided into low/medium (0-.799) and high (.800-1.00) 0=low/medium 1=high	UN Development Programme

Summary of Variables Included in the Analyses (Continued)

Quality of governance factor	World Governance Indicators: -Voice and accountability "perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media" -Political stability and absence of violence "perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism" -Government effectiveness "perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies" -Regulatory quality "perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development" -Rule of law "perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence" -Control of corruption "perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests"	-2.5 to +2.5 (weak to strong)	WB
Latin America dummy	Nations that are located in Latin America/the Caribbean	0=not in Latin America 1=Latin America	CIA World Factbook
Welfare (macro social support)	Percent of each nation's gross domestic product spent on public health	Percent	UN Development Programme
Mono religion	More than 90 percent of nation belong to same religion	0=Not mono religious 1=Mono religious	CIA World Factbook
Female labor participation	Percent females participating in the labor force per 100,000	Percent	WB

Summary of Variables Included in the Analyses (Continued)

Percent youth	Percent male and females between 15 and 24 of age	Percent	WB
Sex ratio	Number of males per 100 females	Males/100 females	UN
Incarceration rate	Number of individuals imprisoned	Per 100,000	ICPS
Independent variables (Micro)			
Gender	Number of males and females	Recode 1= male 0=female	WVS
Age	18-97	Years	WVS
Income scale	Scale of incomes?	Lower step, second step, third step, fourth step, fifth step, sixth step, seventh step, eight step, ninth step, upper step	WVS
Marital status	Dummy for divorced/separated	1=living apart, but steady relation; 2=divorced, separated, widowed; 3=single, never married; 4=widow; 5=separated; 6=divorced; 7=living as married; 8=married Recode 0=not divorced, separated 1=divorced/separated	WVS
Religiosity factor	How important is god in your life?	1-10 (Not important→ very important)	WVS
	Religion is important in your life?	1=not at all important; 2=not very important; 3= rather important; 4=very important	WVS
	How often do you attend religious services?	1=never; 2=less often; 3=once a year; 4=only holy days; 5=once a month; 6=once a week; 7=more than once a week	WVS
Trust dummy	Most people can be trusted?	1=most people can be trusted; 2=need to be very careful Recode 0=no 1=yes	WVS
Unemployment dummy	Employment status?	1= full-time; 2= part-time; 3= self-employed; 4=retired; 5=housewife; 6=student; 7=unemployed; 8= other Recode 0=not unemployed 1=unemployed	WVS
Frustration factor	How satisfied are you with your life?	1-10 (Satisfied→ Dissatisfied)	WVS
	How much freedom you feel?	1-10 (Very→ not at all)	WVS
	Feelings of happiness?	1=very happy; 2=quite happy; 3=not very happy; 4=not happy at all	WVS
	Satisfaction with the financial situation of household?	1-10 (Satisfied→Dissatisfied)	WVS

8.4   *Analytical Strategy*

A number of analyses were conducted in this study: Exploratory Factor Analysis (EFA),

Weighted Leafigurest Squares (WLS) Regression (regular and stepwise), Stepwise Logistic

Regression, Exact Logistic Regression, and Multilevel Structural Equation Modeling (SEM).

8.4.1   *Statistical Transformations*

Centering of continuous variables before creating a product is important because it aids in

interpreting the coefficients of the interaction terms. Variables are often measured on different

scales and centering these helps standardize the product. When using centering, a constant is

subtracted from each value of the variable such that the mean is zero (Scientific Software

International, 2015). For these data, group mean centering is used. Centering may also be used

as a remedy for multicollinearity (Rogers & Pridemore, 2013).

Other transformations of variables are made to ensure assumptions of particular analyses,

such as linear regression, are met. Logarithmic transformation is a widely used practice in cross-

national violence research because most indicators are skewed to some extent on a cross-national

scale (e.g., Rogers & Pridemore, 2013). A large number of variables, both independent and

dependent, are log transformed. Natural logarithm transformation is conducted when continuous

variables are not normally distributed due to skewness. When a non-linear relationship is present,

a square transformation may be used in order to linearize the relationship between the

independent variable and the outcome. Multiyear averages are also used as a method of

transforming variables. This method is discussed in the 4.4.3 section on missing data below.

8.4.2 *Factor Analysis*

Factor analysis is a statistical method used for reducing data by investigating variability. A number of observed variables are added in the analyses with the intention of finding a latent (unobserved) underlying construct. Covariances and correlations of the variables are examined in relation to the latent construct. There are two different types: exploratory factor analysis and confirmatory factor analysis. The type of FA used depends on the purpose of the analysis (Institute for digital reserach and education UCLA, 2015). An exploratory factor analysis is the procedure whereby different models are tested and refined until there is an appropriate fit. When evaluating different models, it is important to focus on eigenvalues of the size, the plot for the Scree test, the chi-square test, and percent explained variance. Factor loadings should ideally not be smaller than .5.

Often, measures used in criminological research are multifaceted and several variables may need to be combined into one factor because one item/variable may not be able to capture a given construct. (Lin & Mieczkowski, 2011). Using FA, indicators of quality of governance, religiosity, and frustration to be able to run more parsimonious models were created. Factor analyses with maximum likelihood extraction were conducted in SPSS and MPlus as part of the multilevel models. This method extracts factors until there are no correlations left. After the FAs were conducted, reliability of the indices was tested using Cronbach's Alpha Reliability Test.

8.4.3 *Weighted Least Squares (WLS) Regression*

Weighted Least Squares (WLS) regression is used when one of the assumptions of Ordinary Least Squares (OLS) regression is not met: homoscedasticity of errors. If an OLS is

carried out when heteroscedasticity is present, alpha and beta estimates are not BLUE (i.e., best linear unbiased estimation). The model estimates are not biased but they are inefficient because the standard errors are inflated. There are methods to adjust the standard errors for this issue in OLS (e.g., robust standard errors). However, WLS gives smaller standard errors than a corrected OLS model. In WLS, intercept and slope are estimated such that the sum of squared errors is minimized. A weight based on error variances is added to each case. Cases with larger error variance get a smaller weight accordingly (McClendon, 2002).

Heteroscedasticity is a common problem in cross-national violence research. Because nations vary in their population sizes, it is advisable to conduct a WLS regression and weight the regression by population size to adjust for heteroscedasticity. In addition, a formal test for hetereoscedasticity should also be conducted. The Breush-Pagan/Cook-Weisburg test revealed that all models (homicide, suicide, and LVR) failed to meet the OLS assumption. The models were conducted in Stata using analytic weights (a-weights). For all models, the a-weight is the square root of the population size (Antonaccio & Tittle, 2007).

Another concern in regression models relates to the presence of outliers. Outliers need to be identified as they may bias results. The most commonly used method to address outliers is to conduct sensitivity analyses in conjunction with the main analyses. There are different strategies to conduct sensitivity analyses. For example, Levchak (2014) and Messner et al. (2010) used leverage values to identify outliers, while others have used Cook's D (Antonaccio & Tittle, 2007). As an alternative to removing all outlier cases from analyses, we replicated models with robust regression analyses in Stata. Robust regression (rreg command) is often used instead of WLS when there are outliers or influential cases in the sample. Robust regression adjusts the OLS estimation by weighting the outliers after a number of tests (e.g., Cook's D) (Stata, 2015c).

Estimates from the WLS and the robust regression were compared to examine the impact of the outliers. If results were similar, it was argued that the outliers did not have a strong influence on the results. These results are discussed in further detail in each of the results chapters.

8.4.3.1   *Stepwise Regression*

Stepwise regression is similar to regular OLS. They differ in that the stepwise method runs a number of regression analyses and with each analysis, and the weakest coefficient is dropped from the model. The final model is the best fitted for the distribution (University of Leeds, 2015). Because of the smaller sample sizes of the WVS models for suicide and LVR multilevel modeling was not possible. To test identical models from the homicide chapter and stepwise regression was determined the best alternative. The backward stepwise models were conducted in SPSS, and, similar to the WLV models, analytic weights were added to correct for heteroscedasticity.

8.4.4   <u>*Logistic Regression*</u>

OLS requires a continuous dependent variable. Similar to linear regression, logistic regression is used when the dependent variable is binary. Probabilities of the binary outcome are modeled based on logit functions, specifically the probability of 1. However, the assumptions of logistic regression are different from OLS, in part because it relies on a Bernoulli distribution. A linear relationship between continuous predictors is required and the log transformation of the dependent variable. Logistic regression models are fitted using maximum likelihood estimation because least squares estimation is not possible for a binary outcome (Czepiel, 2002).

SHR was transformed into a binary variable and logistic regressions were carried out for all analyses with this dependent variable. However, there were issues with the WVS stepwise logistic regression models because of sample size. Stepwise logistic regressions produced poor model fit and inflated odds ratios for some of the variables. Because it relies on a different type of distribution, logistic regression is more sensitive to small sample sizes than a typical OLS regression. The odds ratios are a direct function of the sample size: "As sample size increases, the distribution function of the odds ratio converges to a normal distribution centered on the estimated effect" (Nemes, Jonasson, Genell, & Steineck, 2009, p. 55). In other words, small samples produce biased odds ratios. It has been suggested that maximum likelihood estimates should not be used when the sample size is under 100 and that over 500 is appropriate (Long & Freese, 2006). The systematic bias that results from running a logistic regression with a small sample size is problematic. Even though studies may investigate the same or similar variables, small sample sizes will yield larger effects (i.e., larger odds ratios) than large sample sizes. This is a phenomenon documented in medical research and ultimately "we may misinterpret evidence in the literature for an effect when in reality such does not exist" (Nemes et al., 2009, p. 56). Based on these recommendations, another type of logistic regression was run: exact logistic regression. This type of analysis is suitable for smaller sample sizes and is considered more reliable (Stata, 2015a). It does not rely on maximum likelihood estimation but exact estimation. This type of modeling is highly sensitive to skewed variables and outliers. Since it was not possible to conduct a stepwise approach with exact logistic regression, a full model and a number of reduced models were fitted to compare effects of independent variables. The exact logistic regression produces coefficients that are slightly different in terms of interpretation compared to OLS or logistic regression. The coefficients are called the sufficient statistic and are estimated

independently. This means that the other predictors are conditioned out, and the p-value (i.e., probability of sufficient statistic) is calculated from a conditional distribution that is unique to each independent variable.

8.4.5   *Missing Data*

Missing data are a serious issue in cross-national violence research. Studies have reported different strategies to handle missing data, including mean replacement (S F Messner & Rosenfeld, 1997; Yodanis, 2004) and multiyear averages (Altheimer, 2008; Chon, 2012). In order to address the issue of missing data and based on the assumption that macro-level indicators remain relatively stable over a short time span, multiyear averages are employed to control for yearly fluctuations (and to some extent, measurement errors) in homicide rates (e.g., see Altheimer, 2008; Chon, 2012; Krahn et al., 1986) and suicide rates (Shah, 2011). Marshall and Block explained that "averaging, although certainly not foolproof, is definitely considered an appropriate method to improve the reliability of measures" (2004, p. 304). Even over the span of a short number of years, there can be drastic changes in homicide or suicide rates within a nation. These fluctuations result in an inflated average rate of violence, which may not be representative of the nation's typical levels of violence. Another method employed in cross-national research to adjust for missing values involves taking the average estimate of neighboring nations (Ouimet, 2012). This method appears problematic since countries are culturally and historically unique, and neighboring countries may be characterized by distinct levels of violence (e.g., the United States and Canada).

Analyses were replicated using one year estimates (2008) and five-year averages (2008-2012) to compare the divergence in results. Minimal differences were found and coefficients for

both homicide and suicide rates were largely similar, suggesting short-term stability in these measures. Multiyear averages were selected because they increased the sample size. Another rigorous method was used to address missing values on the independent variables: multiple imputation by chained equations (MICE).

  Multiple Imputation by Chained Equations (MICE). Multiple imputation (MI) methods usually require that the data be multivariate normal. However, this assumption can be relaxed by specifying a chained imputation. With this method, several datasets (m) are imputed with different values. After imputation, the imputed values are added to estimates and variances, and selected analyses are estimated based on all imputations. While many different numbers of imputations have been used, larger numbers are becoming increasingly common (Gruenewald & Pridemore, 2012). Stata recommends that the number of imputations reflect the percent missing values (Stata, 2015b).

  Imputation models are built by specifying the type of analysis to be run on each variable to be imputed. Each variable is imputed by running a regression analysis where the imputed variable is the dependent variable. These are the conditional models. For the majority of the variables, predictive mean matching (pmm) was used. This method is appropriate when the variable is skewed and it limits the bounds of the imputed variables to the lowest and highest existing values of that same variable. This ensured that no extreme values outside the bounds of the observed values were imputed. To make sure there were no problems with convergence in the imputation model, each conditional model was estimated to examine for issues.

  Before estimating MI, baseline models were run to check for diagnostic issues, such as heteroscedasticity, variance inflation, and convergence. MI was used for all macro-level analyses not using WVS data. Dependent variables were not imputed but all independent variables with

missing values were imputed using 50 iterations. The multiply imputed dataset was then used to conduct macro-level analyses. The imputed models were compared to the non-imputed (baseline) models in order to determine whether the imputed models were preferable. The coefficients of the imputed model are fairly straightforward to interpret. However, an additional piece of information that is important to examine is the fraction of missing information (FMI). Fraction missing information (FMI) is a tool for examining the reduction in precision of the estimates from missingness.

8.4.6 *Multilevel Structural Equation Modeling (ML-SEM)*

The main goal of structural equation modeling (SEM) is to explain covariances between variables. SEM is a powerful technique that is primarily used to model latent variables. It is a common statistical tool in disciplines in which many constructs are no observed (e.g., psychology). SEM consists of two parts, the first being a confirmatory factor analysis (CFA), which is a measurement model that groups items into factors and determines validity of the measure. The second part is the structural model, which tests relationships between latent constructs and also tests predictive validity.

Determining model identification is crucial in SEM modeling. A model must be just-identified (i.e., saturated) or over-identified in order to have a solution. In an over-identified model, there are an infinite number of solutions and an iterative estimation is used to achieve the best fitting model. MPlus automatically chooses the best estimator based on the structure of the data. The estimation used in this dissertation is maximum likelihood estimation with robust standard errors (MLR) because some of the variables are not normal. Generally, identification is not possible if there are more free parameters than number of groups (i.e., nations). As a

guideline, the models always had more parameters than groups. The number of free parameters is related to the complexity of the model, so models with more latent factors have more parameters than models with more observed variables. Model fit of micro-macro SEM models is not very straightforward. There is no fit for the combined model, but fit values are given for different levels (i.e., within and between). Model fit cannot be interpreted in a traditional sense relating to SEM models. For example, chi-square values can be very large if the n is large. Generally, a fitting value is zero when predicted and observed covariance matrices are identical. The purpose is to try to decrease the fitting value.

Multilevel SEM (ML-SEM), a combination of multilevel analysis and structural equation models, are herein employed (Mehta & Neale, 2005). Multilevel SEM was carried out in order to test the micro- and macro-level effects of variables on the dependent variables, as well as interactions between various indicators. The statistical software programs SPSS and Mplus were used for all analyses. In the social sciences, data structures are often multilevel in nature (e.g., individuals nested within a higher order unit). In this study, individuals were nested within nations; thus there are two units of analysis. Some variables relate to individual characteristics and these individuals are grouped into higher-order units. Each level of the structure has different characteristics that may influence the outcome variable of interest. There may be a variation in the outcome that is a result of group-level or individual-level differences.

Statistical models with data on individual- and higher-level aggregations, such as hierarchical linear modeling or multilevel models, require individual-level dependent variables (Preacher, Zyphur, & Zhang, 2010). Some of the proposed analyses in this research do not fit this requirement because the dependent variables are national-level rates or indicators. A typical solution may be to aggregate the individual-level independent variables to the group level, and to

perform the analysis at the group level. The problem with this approach is that it washes out within-group variations. A more appropriate statistical model is the micro-macro model of multilevel SEM (Croon & van Veldhoven, 2007). This type of conceptualization has also been referred to as *bottom-up-effects* (Bliese, Chan, & Ployhart, 2007; Kozlowski & Klein, 2000) or *upward influence* (Griffin, 1997).

The number of groups in level 2 can be a concern in multilevel SEM. While sample size requirements depend on the goals of the research, it has been estimated that 40 groups may be enough for examining between-level factor structure; 60 groups or more are recommended to detect large effects at the between-group level, while more than 100 groups are needed to detect smaller effects (Meuleman & Billiet, 2009). This research uses 57 groups[5] (i.e., nations), which meets the requirement for detecting large effects. We may, however, not be able to detect small effects (Duncan, Duncan, & Strycker, 2002). Unfortunately, there were too many missing values for the suicide data. The sample sizes ranged in the 30s, and it was decided to instead aggregate the individual-level data, similar to what many other studies have had to do. In SEM, transformations of non-normal variables are not needed; instead, a method addressing the non-normality is chosen. These are assessed in the SEM analyses (Ullman, 2006).

8.5   *Summary*

This chapter provided a detailed description of the analytical strategy of this dissertation. First, the different types of transformations used to modify certain variables included centering, natural logarithm and square transformations. The following sections detail the statistical

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[5] Because of missing data on some variables, the group-level N varies among the analyses. However, great effort was made to ensure that the sample size remained as large as possible.

analyses: Factor analysis, weighted least squares, logistic regression, and multilevel structural equation modeling. Additionally, one section discussed the issues and remedies relating to missing data.

Chapter 5: The Predictors of Strain on Aggregate Homicide Rates

This chapter investigates the first research question: how do multilevel factors influence national homicide rates in a cross-national sample? The analyses aim to explore the relationships between established predictors of homicide identified in the literature and the latent quality of individual-level frustration, while simultaneously examining the moderating role of individual- and national-level social support. The analyses are presented in three stages. First, a pure macro-level analysis was carried out to investigate the aggregate predictors of homicide. Replications are carried out to compare and contrast results with different operationalizations of the same concept (e.g., infant mortality rate as measures of poverty, the Gini coefficient, and income ratio as measures of inequality). Table 3 lists the hypotheses, variables, and analyses relevant to the first research question.

Table 3. Hypotheses, Variables, and Analyses for RQ 1: Impact of Multilevel Factors on Aggregate Homicide Rates

Hypothesis	Variable	Transformation	Analytic Strategy (N)
H1: Higher levels of macro strain are associated with higher homicide rates, irrespective of the level of development and controlling for social controls. The relationship between strain and homicide rates is attenuated by welfare.	UN Homicide rate	Natural logarithm (log); multiyear average	**Table 5:** Weighted Least Squares Regression with Multiple Imputation (N=181)
	Infant mortality rate	Natural logarithm (log)	
	Gini index	Natural logarithm (log)	
	HDI	None	
	Governance	None	
	Welfare Welfare*infant mortality Welfare*gini	Natural logarithm (log) Log, Centered Log, Centered	
	Mono religion dummy	None	
	Female labor participation	None	
	Incarceration rate	Natural logarithm (log)	
	Percent youth	Squared	
	M-F sex ratio	Outliers recoded	
	Latin America dummy	None	
H2: At the national level, higher levels of micro strain are associated with higher homicide rates, net of the effects of social controls. The relationship between micro strain and homicide rates is mediated by aggregate-level frustration. The relationship is also moderated by trust.	UN Homicide rate	Multiyear average	Figure 1: Multilevel Structural Equation Modeling, random intercept and fixed slope (Between level N= 54)
	Gender dummy	None	
	Unemployment dummy	None	
	Income scale	None	
	Divorced/separated dummy	None	
	Religiosity factor	None	
	Trust dummy	None	
	Frustration factor	None	
H3: At the national level, higher levels of macro strain lead to higher homicide rates, net of effects of social control and control variables. The relationship between macro strain and homicide rates is mediated by aggregate-level frustration. The relationship between macro strain and homicide rates is moderated by welfare.	UN Homicide rate	Multiyear average	Figure 2: Multilevel Structural Equation Modeling, random intercept and fixed slope (N= 52)
	% Youth	None	
	Latin America dummy	None	
	Infant mortality	None	
	Mono religion dummy	None	
	Incarceration rates	None	
	Welfare	None	
	% Unemployed	None	
	Frustration factor	None	

There are three main analyses presented in this chapter. First, the macro-level relationships between economic deprivation (i.e., poverty and inequality, which are the primary strain variable in homicide research), welfare, and social control (i.e., religion, quality of governance, female labor participation, and incarceration rates) are tested, while controlling for high development nations, age, gender, and Latin American countries. The analyses also contrast results with the inclusion of poverty (i.e., infant mortality rate) versus inequality (Gini index). Second, multilevel relationships between micro-level strains (i.e., unemployment, income, and divorce/separation), a latent construct of frustration, social trust, and homicide rates are tested, while controlling for social control (a latent measure of religiosity) and proportion males. Both within- and between-country variations are estimated in these models. The third model was theoretically similar, but the predictors consist of macro-level strain (infant mortality rate and percent unemployed), social control (nations with one dominant religion and incarceration rate), social support (welfare), and controls (percent youth and Latin American region).

9.1   *Descriptive Statistics for UN Homicide Rates and Main Indicators*

Table 4 presents descriptive statistics for homicide and bivariate correlations between the dependent and independent variables. The mean multiyear average homicide rate is 8.78 (SD=11.62) per 100,000 people. Homicide rates are positively correlated with the infant mortality rate (r=.585, p<.001), percent female labor participation (r=.216, p<.01), percent youth (r=.502, p<.001), and incarceration rate (r=.200, p<.01). Higher levels of poverty, more women in the work force, more youth, and higher levels of incarceration are related to higher homicide rates or vice versa, though the relationships are markedly weaker for female labor participation and incarceration rate. Homicide rates are negatively correlated with the quality of governance

factor (r=-.496, p<.001) and the sex ratio (r=-.146, p<.05), indicating that poorer quality of

governance and more men than women in the population are linked to higher homicide rates or

vice versa.

Table 4. Descriptive Statistics and Bivariate Correlations between Main Indicators and Multiyear Average Homicide Rates (N=187)

	1) UN Homicide rate log	2) Infant mortality log	3) Governance	4) Welfare log	5) Female labor	6) % Youth^2	7) M-F Sex Ratio	8) Incarceration rate
1)UN Homicide rate log								
2) Infant mortality log	.585***							
3) Governance	-.496***	-.816***						
4) Welfare log	-.113	-.266***	.342***					
5) Fem labor	.216**	.225**	-.039	.024				
6) % Youth^2	.502***	.722***	-.630***	-.314***	.017			
7) M-F Sex Ratio	-.146*	.169*	-.175*	-.396***	-.270***	.286***		
8) Incarceration rate	.200**	-.349***	.266***	-.003	-.077	-.082	-.331***	
Mean (SD)	8.78 (11.62)	31.51 (28.84)	-.04 (.98)	6.30 (2.40)	52.41 (16.11)	.18 (.03)	99.95 (12.93)	163.92 (135.16)
N	187	182	187	179	178	181	181	175

Note: Means and standard deviations of original values (no transformations)
+p<.10, *p<.05, **p<.01, ***p<.001

9.1.1   *The Role of Influential Cases: Major Correlates of Homicide Rates, Disaggregated by Region*

In order to examine the potential effects of outliers in correlation analysis, the sample was split into regional subsamples in order to investigate the stability of cross-national predictor areas across countries with varying levels of development. Outlier cases are excluded. *Table 6* presents correlations between homicide rates, Gini index, infant mortality rate, welfare level, incarceration rate, and quality of governance, with outliers removed.

The stability in the correlation coefficients between infant mortality rate and homicide rates across regions is notable. This is not the case for the correlation coefficients between the Gini index and homicide rates, which are rather weak in Africa and Europe. This finding suggests that effects of inequality on homicide rates may be strongly regional or dependent on other factors. Incarceration rates are positively correlated with homicide in Asia and Europe but no other regions, suggesting that the effects of punitiveness may be more pronounced in these areas. In Europe and Asia, increases in quality of governance are linked to decreases in homicide rates and vice versa, indicating that the political climate may not be related to violence in all regions. Interestingly, welfare is negatively correlated with homicide rates in Latin America, the Americas (including the U.S. and Canada), and Europe, but a positive correlation is observed in Africa and Asia. In other words, levels of government spending on healthcare are linked to both increasing and decreasing homicide rates.

Table 4. Correlation Matrix by Region for Main Indicators in Macro Homicide Model (N=182)

Region	N	Gini (log) & homicide	Infant mortality rate (log) & homicide	Welfare (log) & homicide	Incarceration rate (log) & homicide	Governance & homicide
Full Sample	182	.636***	.600***	-.113	.200**	-.499***
Africa	52	.346*	.401**	.423**	.082	-.087
Americas[6]	37	.369+	.652***	-.435*	-.064	-.329*
Latin (excl. US & Canada)	35	.140	.410*	-.240	-..241	.140
Asia	48	.001	.595***	.036	.336*	-.703***
Europe	41	.316+	.691***	-.592***	.797***	-.638 ***

Note: +p<.10, *p<.05, **p<.01, ***p<.001

9.1.2 *Measures of Deprivation Predicting Homicide Rates: Weighted Least Squares (WLS) with Multiple Imputation*

Table 7 illustrates the results from the multiply imputed weighted least squares (WLS) regression analyses predicting homicide rates. To assess the predictive power of relative versus absolute deprivation, four models are tested: inequality (Gini index), poverty (infant mortality rate), and the moderating effects of welfare on the relationships between both 1) inequality and 2) poverty. The Gini index was excluded from subsequent analyses. This indicator was highly unstable in most models and was extremely sensitive to outliers. More importantly, Gini index data are unreliable and include a high proportion of missing values (approximately 50 percent).

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[6] A correlation was tested also by removing the U.S. from the sample. All correlation coefficients decreased slightly but not markedly and the significance levels remained the same, except for quality of governance (from .01 to .05). The U.S. had a slight influence on the correlations but the largest differences were found when both the U.S. and Canada were removed.

Results are also similar when using Gini index and infant mortality rate, which justified carrying out analyses using only the poverty measure as an indicator of economic deprivation.

In *Model 1*, increases in infant mortality rates are associated with increases in homicide rates (β =.921, p<.001), even when controlling for high HDI nations. High HDI nations have higher homicide rates (β =.512, p<.05). Social control variables have strong to marginal associations with homicide rates: Higher incarceration rates are associated with higher homicide rates (β =.379, p<.001), while nations with more than 90 percent of the population adhering to one religion tended to have lower homicide rates (β =-.248, p<.10). Welfare is marginally related to homicide rates (β =.280, p<.10), indicating a tendency for nations with higher levels of welfare to also have higher homicide rates. Among the control variables, male-female ratios are negatively related to homicide rates (β =-.048, p<.001), such that fewer men (and more women) in the population leads to lower homicide rates. Latin American nations have higher homicide rates (β =1.584, p<.001). The overall model is significant (F=44.22, p<.001) and it explains 72.3 percent of the variability in homicide rates. The FMI ranges between 0 and 2 percent, suggesting that only a small fraction of precision is lost due to imputation of missing values.[7]

Robust regression analysis reveals that outliers have some influence on the coefficients. Most of the coefficients decrease about .2 but there is no change in the significance level. The HDI indicator and level of welfare are most affected by outliers because both become non-significant when robust regression is used.

Model 2 examines the potential moderating effect of welfare in the relationship between infant mortality rates and homicide rates. All the covariates are very similar in strength and

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[7] In comparing the non-imputed WLS model (n=163) with the imputation model (n=181), it is evident that the latter provided the best fitting model. The coefficients are very similar in both models, but the imputation model has the clear advantage of having a sample size of nearly 20 countries more.

significance levels to those presented in *Model 1*. However, no moderating effect of welfare on

homicide is observed. There are marginal direct effects of welfare on homicide rates but the

relationship between poverty and homicide rates is not affected by level of welfare.

Table 5. Between-country Predictors of UN Homicide rates: Weighted Least Squares with Multiple Imputation (N=181)

	Model 1: Poverty		Model 2: Poverty with welfare*poverty interaction	
Variable	B(SE)	FMI	B(SE)	FMI
Infant mortality log	.921(.11)***	.015	.919(.13)***	.016
HDI dummy	.512(.25)*	.003	.501(.26)+	.006
Quality of governance	-.136(.11)	.008	-.137(.13)	.008
Welfare log	.280(.15)+	.011	.284(.22)+	.011
Religion dummy	-.248(.13)+	.000	-.284(.18)+	.001
Female labor participation	-.001(.00)	.005	-.001(.00)	.005
Incarceration rate log	.379(.08)***	.022	.379(.09)***	.023
% Youth squared	7.037(7.08)	.005	7.158(6.66)	.006
M-F Sex Ratio	-.048(.01)***	.004	-.048(.02)**	.005
Latin America dummy[8]	1.584(.16)***	.001	1.583(.19)***	.001
Infant*welfare(centered, log)	--	--	-.019(.15)	.021
F-ratio	44.22***	--	39.98***	--
Mean R^2(adjusted)	.723(.707)		.723(.705)	

Note: +p<.10, *p<.05, **p<.01, ***p<.001

9.1.3 *Multilevel Modeling of Homicide Rates: Structural Equation Modeling (SEM) using World Values Survey Data*

The main goal of this analysis is to observe the potential mediating effect of frustration at

the national level with variables in their aggregated forms (i.e., each cluster, or nation, had an

aggregated mean of the individual level variable). Multilevel models focus on between-country

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[8] The model was replicated using regional dummies for Latin America, Asia, and Africa. Europe is the reference category. Latin America remains significant but neither Asia nor Africa is significant. These dummies are not tested in the interaction model.

differences. Between-country analyses investigate relationships between strains, social control, social support and homicide rates, while controlling for gender.

Figure 3 displays the between-country results of the micro SEM model (n=54). Higher levels of individual religiosity are associated with higher homicide rates (β=.556, p<.001). Higher levels of individual frustration are associated with lower homicide rates (β=-.315, p<.01). Other strains, proportion unemployed, mean individual income scale, and proportion divorced/separated are not associated with homicide rates. Proportion of individuals who trust others is not related to homicide rates. Overall, the model has an adequate fit at the between-country level (SRMR=.217).

Figure 3. Between-country Results for Homicide Rates using World Values Survey data, Micro Model (n=54)
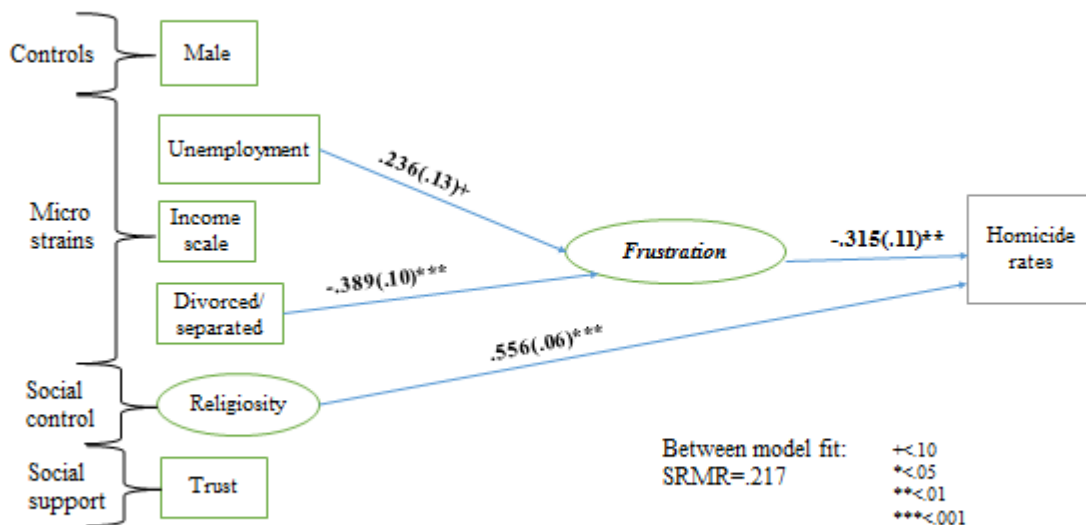
Figure 4 presents the between-country results for the mixed multilevel SEM model (n=52). This model is different from the previous one because it uses the frustration indicator to

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assess its relationship with macro-level indicators, whereas the previous model investigated micro-level predictors. Infant mortality rates are positively associated with homicide rates (β=.520, p<.001). Higher incarceration rates are linked to higher homicide rates (β=.208, p<.10). Finally, higher average levels of individual frustration are associated with lower homicide rates (β=-.222, p<.10), though this relationship is only marginally significant. Consistent with previous models, Latin American countries have higher homicide rates (β=.507, p<.01). Percent youth, percent unemployed, nations with one dominant religion, and welfare are not associated with changes in homicide rates. Overall, the model fit is quite good (SRMR=.064).

Figure 4. Between-country Results for Homicide Rates using World Values Survey data, Mixed Model (n=52)
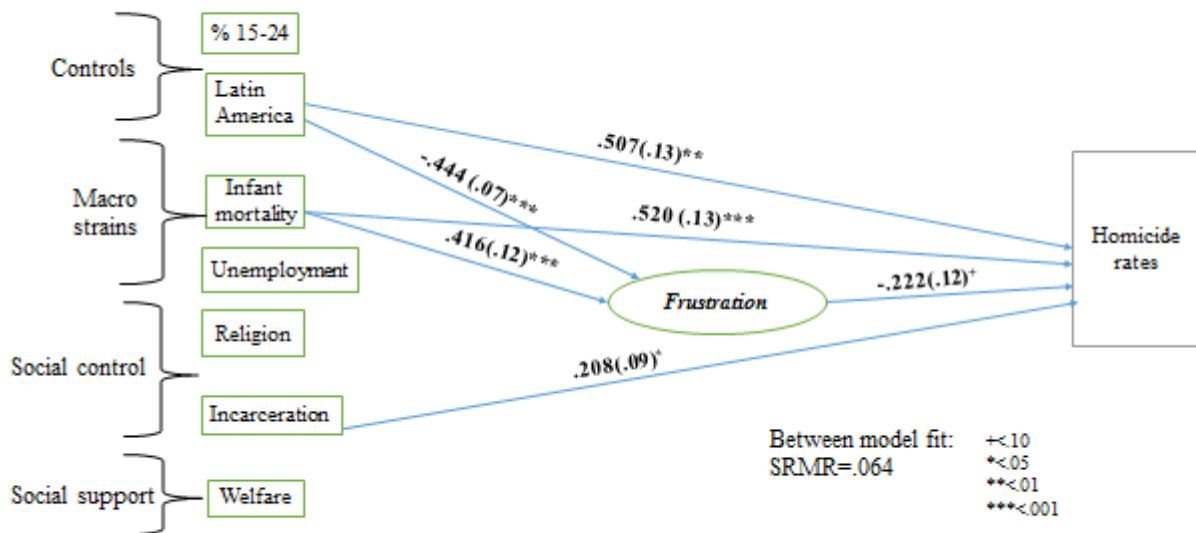
9.2   *Summary*

This chapter investigates the impact of different types of strains and social controls on homicide rates, using both macro-level and multilevel indicators. The WLS models examine the

effects of indicators at the macro level with a large sample. These models indicate that poverty is a strong and consistent predictor of higher homicide rates. Social controls have less of an impact, however. Only incarceration rates are positively and strongly linked to homicide rates. Nations with one dominant religion have marginally lower homicide rates. Social support at the macro level, measured by welfare, is also marginally significant but in the opposite direction as predicted. Welfare also fails to influence the relationship between poverty and homicide rates. While poverty is linked to higher homicide rates, a high level of HDI is also associated with increases in homicide rates.

The multilevel analyses show that micro strains do not predict variations in homicide rates. Macro strain (poverty), however, remains a predictor of homicide rates. Social control, as measured by nations with one dominant religion (-) and incarceration rates (+) at the macro level, and religiosity (+) at the micro level, is a persistent predictor of both lower and higher homicide rates. Finally, contrary to theoretical expectations, individual frustration is linked to lower homicide rates.

Chapter 6: The Predictors of Strain on Aggregate Suicide Rates

This chapter investigates the second research question: how do multilevel factors influence national suicide rates in a cross-national sample? The main premise of these analyses is to explore the relationship between well-established variables in the homicide literature and the latent quality of individual-level frustration, while simultaneously examining the moderating role of individual- and national-level social support. However, the original idea had to be revised because of the limited availability of suicide data. The multilevel SEM models had such small cluster sizes (30s-40s) that these analyses did not produce reliable results. Instead, the WVS data are aggregated to national level and all the analyses are at the macro level. Similar to the previous chapter, analyses are presented in three parts. First, a pure macro-level investigation is carried out in order to obtain an in-depth understanding of the national-level processes before moving on to multilevel analyses. *Table 8* (below) lists the hypotheses, variables, and analyses pertinent to the second research question.

Table 6. Hypotheses, Variables, and Analyses for RQ 2: Impact of Multilevel Factors on Aggregate Suicide Rates

Hypothesis	Variable	Transformation	Analytic Strategy (N)
Higher levels of <u>macro strain</u> lead to higher levels of suicide rates regardless of level of development, net of effects of social control, and controls. The relationship between strain and suicide rates is attenuated by welfare.	WHO Suicide rate	Natural logarithm (log) Multiyear average	**Table 9:** Weighted Least Squares Regression with Multiple Imputation (N=93)
	Infant mortality rate	Natural logarithm (log)	
	HDI dummy	None	
	Governance	None	
	Welfare	Natural logarithm (log)	
	Welfare*infant mortality	Log, Centered	
	Welfare*gini	Log, Centered	
	Mono religion dummy	None	
	Female labor participation	None	
	Incarceration rate	Natural logarithm (log)	
	Percent youth	Squared	
	M-F sex ratio	Outliers recoded	
At the national level, higher levels of <u>micro strain</u> are associated with higher suicide rates, net of the effects of social controls. The relationship between micro strain and suicide rates is <u>mediated</u> by aggregate-level frustration and <u>moderated</u> by trust.	WHO Suicide rate	Multiyear average	**Table 10:** Weighted Stepwise Regression (N=42)
	Gender dummy	None	
	Unemployment dummy	None	
	Income scale	None	
	Divorced/separated dummy	None	
	Religiosity factor	None	
	Trust dummy	None	

Three hypotheses are tested. The first hypothesis investigated the macro-level relationships

between economic deprivation (i.e., poverty), welfare, and social control (i.e., nations with one

dominant religion, quality of governance, female labor participation, and incarceration rates)

while controlling for high development nations, age, and gender. Latin American countries are

not included as a control variable because unlike homicide analyses, there are no theoretical or

methodological justifications for doing so. The inclusion of a measure of social control allows

one control for the regulating effects of different forms of informal and formal social control.

The second hypothesis assessed the relationship between aggregated micro-level strain,

frustration, social trust, and suicide rates, while controlling for religiosity and proportion of

males in the population. Because of the limited sample size of suicide data, it is not possible to

conduct multilevel analyses or one-level SEM. Instead, the WVS data are aggregated to national-

level means. It is not possible to test the same multilevel relationships as in the homicide chapter.

10.1 *Descriptive Statistics for WHO Suicide Rates and Main Indicators*

Table 9 presents descriptive statistics for suicide rates as well as correlations between all

continuous independent variables. The mean multiyear average suicide rate is 9.94 (SD=8.64)

per 100,000 persons. Suicide rates are correlated with nearly all independent variables, with the

exception of incarceration rates. Suicide rates are negatively correlated with infant mortality

rates (r=-.387, p<.01) and the sex ratio (r=-.497, p<.01). Conversely, suicide rates are positively

correlated with quality of governance (r=.232, p<.05), welfare level (r=.366, p<.05), female labor

participation (r=.236, p<.01), and percent youth (r=.475, p<.01), indicating that most indicators

vary in the same direction as suicide rates. However, none of the correlation coefficients are

particularly strong. These findings are distinct from the homicide results in that there is less of a

discernible pattern between the indicators and suicide.

Table 7. Descriptives Statistics and Bivariate Correlations between Main Indicators and Multiyear Average Suicide Rates (N=108)

	1) Suicide rate log	2) Infant mortality log	3) Governance	4) Welfare log	5) Fem labor	6) % Youth	7) M-F Sex Ratio	8) Incarc- eration rate
1)Suicide rate log								
2) Infant mortality log	-.387[**]							
3) Governance	.232[*]	-.790[***]						
4) Welfare log	.366[*]	-.381[***]	.359[***]					
5) Female labor	.236[**]	-.126	.253[***]	.180[+]				
6) % Youth	.475[***]	.796[***]	-.637[***]	-.314[***]	-.219[*]			
7) M-F Sex Ratio	-.497[***]	.085	.090	.441[***]	-.318[***]	.271[**]		
8) Incarceration rate	.044	.260[**]	-.168[+]	-.087	.049	.160	-.354[***]	
Mean (SD)	9.94(8.64)	13.76 (11.61)	.42(.93)	6.72 (2.36)	49.31 (10.48)	.17 (.03)	98.80 (12.48)	200.52 (143.48)
N	98	105	108	105	103	105	105	107

Note: Means and standard deviations of original values (no transformations)
+p<.10, *p<.05, **p<.01, ***p<.001

10.1.1 *The Role of Influential Cases: Major Correlates of Suicide Rates, Disaggregated by Region*

The correlation analysis for suicide rates is conducted in an identical manner to the homicide correlation analysis. To reiterate, the purpose of these correlations is to investigate whether the Pearson's coefficients varied by region for the same indicators. Outlier cases are

excluded here as well. In *Table 10,* correlations between suicide rates, infant mortality rate, welfare level, incarceration rate, and quality of governance, are presented with outliers removed.

Interestingly, none of the indicators show stability across the regions. Correlations for Africa are not interpreted because of the small sample size. Infant mortality rates are negatively correlated with suicide rates in the full sample. Welfare levels vary in the same direction as suicide rates, suggesting that suicide rates increase with levels of welfare and vice versa. The social control indicator percent female labor participation correlate with suicide rates across a few regions: the Americas, Latin America, and Asia. Notably, an increase in the percent female labor participation is related to a decrease in suicide rates (or vice versa) in the Americas and Latin America, but the opposite relationship is observed in Asia. Notably, these findings are different from what is found in the homicide chapter.

Table 8. Correlation Matrix by Region for Main Indicators in Macro Suicide Model (N=98)

Region	N	Infant mortality rate (log) & suicide	Welfare (log) & suicide	Incarce-ration rate (log) & suicide	Govern-ance & suicide	Female labor & suicide
Full Sample	98	-.390***	.465***	-.068	.150	.421***
Africa	5	-.575	-.295	.572	.827[+]	.824
Americas	36	-.121	.264	-.107	-.017	-.620***
Latin (excl. US & Canada)	34	.014	-.003	-.198	-.175	-.742***
Asia	24	-.197	.546*	.481[+]	.043	.834***
Europe	40	.082	.044	.234	-.186	.146

Note: +p<.10, *p<.05, **p<.01, ***p<.001

10.1.2 *Measures of Deprivation Predicting Suicide Rates: Weighted Least Squares (WLS) with Multiple Imputation*

The multiply imputed weighted least squares regression models for suicide rates and strain variable are presented in *Table 11*. Two models are tested: poverty (infant mortality rate), and the moderating effects of welfare. The purpose of having these two models is to test direct and indirect effects of welfare on suicide rates, as an extension of social support theory to suicide.

In *Model 1*, increases in infant mortality rates are associated with decreases in suicide rates when controlling for high HDI nations (β =-.704, p<.01). Unlike the homicide models in chapter 5, quality of governance is significant. Higher scores on quality of governance lead to higher suicide rates (β =-.566, p<.001), suggesting that nations with better functioning governments have higher suicide rates. Social control variables showed varied associations with suicide rates. Religion is only marginally associated with suicide rates; nations with more than 90 percent of the population adhering to one religion tended to have lower suicide rates (β =-.514, p<.10). Percent female labor participation predicted higher suicide rates (β =.046, p<.01). The level of HDI and levels of welfare are not associated with changes in suicide rates. However, there is no significant difference in suicide rates between low/medium and high HDI nations. Among the control variables, the male-female ratio was negatively related to suicide rates (β =-.079, p<.001). Percent youth is marginally significant; lower proportions of youth are associated with higher suicide rates (β =-9.938, p<.10). The overall model is significant (F=21.15, p<.001) and it explains 69.7 percent of the variability in suicide rates. The FMI ranges between 0 and 9.5

percent, indicating that the model precision is not strongly impacted by imputed estimates.[9] Robust regression analysis shows slight to moderate decreases in the coefficients when adjusting for the outliers. Most importantly, the infant mortality rate decreases substantially and becomes non-significant. *Model 2* investigates the potential moderating effect of welfare in the relationship between infant mortality and suicide rates. All the covariates are very similar in strength and significance level to Model 1. However, there are no direct effects of welfare on suicide rates, and no significant moderating effect of welfare on the relationship between poverty and suicide rates is observed.

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[9] In comparing the non-imputed WLS model (n=90) with the imputed model (n=93), the latter model provided a slightly better fit. The coefficients were very similar in both models. To maximize sample size, the imputed model was favored.

Table 9. Between-country Predictors of WHO Suicide Rates: Weighted Least Squares with Multiple Imputation (N=93)[10]

Variable	Model 1: Poverty		Model 2: Poverty with welfare*poverty moderator	
	B(SE)	FMI	B(SE)	FMI
Infant mortality log	-.704(.26)**	.095	-.700(.27)**	.093
HDI dummy	.093(.40)	.016	.079(.40)	.016
Quality of governance	-.566(.19)**	.007	-.566(.19)**	.007
Welfare log	.331(.31)	.021	.248(.46)	.020
Religion dummy	-.514(.27)+	.002	-.511(.27)+	.002
Female labor participation	.046(.01)***	.001	.046(.01)***	.001
% Youth squared	-9.938(5.83)+	.034	-9.741(5.91)+	.035
M-F Sex Ratio	-.079(.02)***	.003	-.079(.02)***	.003
Incarceration rate log	.088(.16)	.001	.095(.16)	.003
Infant*welfare (centered, log)	--	--	-.107(.44)	.015
F-ratio	21.15***	--	18.59***	--
Mean R^2(adjusted)	.697(.664)	--	.697(.660)	--

Note: +p<.10, *p<.05, **p<.01, ***p<.001

10.1.3 *Suicide Rates: Stepwise Weighted Regression using Aggregated World Values Survey Data*

The following analyses aim to assess the potential mediation effect between frustration at the national level and aggregate variables (i.e., each cluster, or nation, had an aggregated mean of the individual level variable). However, because of a small suicide rate sample (n<40), it is not possible to conduct multilevel analyses. Because of the limited sample size and number of variables, stepwise analyses are conducted on the aggregated data[11].

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[10] A t-test with Latin (1.489) vs non-Latin (1.799) nations indicated that there is no significant difference in the suicide rate means between the two groups. Although a strong predictor of homicide rates, it was determined that this variable was excessive to include given the small suicide sample.

Table 12 shows the results from the weighted stepwise regression on WVS data and suicide rates. Overall, the aggregated WVS variables poorly predict suicide rates. The stepwise model estimated six models, the sixth one being the best fit. Based on results from *Model 6,* only the proportion of individuals divorced or separated and the religiosity factor are associated with suicide rates. Nations with higher proportions of individuals who are divorced or separated tended to have higher suicide rates ($\beta = .293$, $p < .05$). Countries with a higher average level of individual religiosity tended to have lower suicide rates ($\beta = -.554$, $p < .001$). The strains, proportion unemployed, and the mean income level are not related to suicide rates. Furthermore, the aggregated measure of individual frustration did not predict variations in suicide rates. As seen in *Table 11*, these indicators are removed from the model. The overall model, including proportion divorced or separated and level of individual religiosity, is significant ($F = 14.333$, $p < .001$). While most variables did not significantly predict suicide rates, the proportion of individuals who are divorced or separated and the level of religiosity explain 43.2 percent of the variance in suicide rates, with level of individual religiosity having a stronger effect. Robust regression analyses showed that the relationship between the proportion of individuals divorced or separated in the population and suicide rates is affected by outliers. This indicator became non-significant. Religiosity, however, is not notably affected.

Table 10. Suicide rates: Weighted Stepwise Regression using Aggregated WVS Variables (N=42)[12]

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Variable	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)
Proportion males	.188(2.30)	.185(4.37)	.184(4.36)	.188(2.11)	--	--
Proportion unemployed	-.078(3.37)	--	--	--	--	--
Income level	.204(.23)	.198(.22)	.169(.22)	--	--	--
Proportion divorced/separated	.379(5.56)*	.368(5.45)*	.325(5.20)*	.384(4.94)*	.346(4.92)*	.293(4.50)*
Religiosity factor	-.536(.35)**	-.551(.34)**	-.469(.29)**	-.514(.28)***	-.534(.28)***	-.554(.27)***
Frustration factor	.193(.53)	.190(.53)	.212(.52)	.207(.52)	--	--
Proportion trust	-.198(1.83)	-.167(1.73)	--	--	--	--
F-ratio	4.865***	5.765***	6.785***	8.029***	9.795***	14.333***
R^2(adjusted)	.549(.436)	.544(.450)	.531(.432)	.509(.445)	.479(.430)	.465(.432)

Note: +p<.10, *p<.05, **p<.01, ***p<.001

10.2 *Summary*

This chapter investigated the impact of different types of strains and social controls in a variety of analyses. The WLS models examine the effects of indicators at the macro level with a large sample. These models show that poverty is a strong and consistent predictor of lower suicide rates, but social controls have less of an impact. However, the effects of outliers on the link between poverty and suicide rates are substantial. The relationship is no longer significant, although this is likely due to the small variation in infant mortality rates in this sample. Quality of governance is negatively and strongly linked to suicide rates while percent female labor participation is related to increased suicide rates. Welfare failed to influence the relationship with suicide rates, and also the relationship between poverty and suicide rates.

[12] A stepwise model is run with an interaction term (centered trust*divorce/separated) but it is not significant in any of the submodels.

The analyses with aggregated indicators show that the only aggregated micro strain predicting variations in suicide rates is the proportion divorced and separated. Social control at the micro level also influences suicide rates: higher levels of aggregate individual religiosity lead to lower rates of suicide. Frustration is not linked to suicide rates. Overall, the findings in this chapter indicate that there are disparate effects of strain on homicide and suicide. The indicators in this study are more strongly related to homicide rates than suicide rates, but this discrepancy may be a result of the difference in sample sizes; the suicide sample is about half of the UN homicide sample.

Chapter 7: The Predictors of Strain on Aggregate Suicide-Homicide Ratio (SHR) and Lethal Violence Rates (LVR)

In the final results chapter, a similar research question is posed to explore strains within the stream analogy model: how do multilevel factors influence national SHR and LVR in a cross-national sample? These analyses investigate the relevant indicators that may predict both homicide and suicide, drawing specifically on the stream analogy model of lethal violence. The role of individual-level frustration in the context of social support is the area of interest. First, a macro-level investigation is carried out in order to obtain an in-depth understanding of the national-level processes. For the second set of analyses, and similarly to the issues that arose in the previous suicide chapter, the original idea had to be revised as a result of the limited availability of suicide data. The WVS data are aggregated to the national level and all analyses are conducted at the macro level. These analyses assess how relevant variables predict changes in the suicide-homicide ratio and lethal violence rates, and if certain variables are more strongly associated with either type of violence. Results for two stages of analyses are reported. *Table 13* below lists the hypotheses, variables, and analyses relevant to the third research question.

Table 11. Hypotheses, Variables, and Analyses for RQ 3: Impact of Multilevel Factors on Aggregate SHR and LVR Rates

Hypothesis	Variable	Transformation	Analytic Strategy (N)
H1: Higher levels of <u>macro strain</u> lead to higher levels of LVR regardless of level of development, net of effects of social control and control variables. The relationship between strain and LVR is attenuated by welfare. Macro strain is not related to SHR.	1) WHO SHR 2) WHO LVR	1)Dummy transformation 2)Natural logarithm (log) Multiyear average	1)Logistic regression with Multiple Imputation (N=93) 2)Weighted Least Squares Regression with Multiple Imputation (N=93)
	Infant mortality rate	Natural logarithm (log)	
	Gini index	Natural logarithm (log)	
	HDI	None	
	Governance	None	
	Welfare Welfare*infant mortality Welfare*gini	Natural logarithm (log) Log, Centered Log, Centered	
	Mono religion dummy	None	
	Female labor participation	None	
	Incarceration rate	Natural logarithm (log)	
	Percent youth	Squared	
	M-F sex ratio	Outliers recoded	
	Latin America dummy	None	
H2: At the national level, higher levels of <u>micro strain</u> are associated with higher LVR, net of the effects of social controls. The relationship between micro strain and LVR is <u>mediated</u> by aggregate-level frustration and <u>moderated</u> by trust. Micro strains are not related to SHR.	3) WHO SHR 4) WHO LVR	1)Dummy transformation 2)Natural logarithm (log);Multiyear average	1)Exact Logistic Regression (N=36) 2)Weighted Stepwise Regression (N=42)
	Gender dummy	None	
	Unemployment dummy	None	
	Income scale	None	
	Divorced/separated dummy	None	
	Religiosity factor	None	
	Trust dummy	None	
	Gender dummy	None	
	Unemployment dummy	None	

The first analyses tested the relationships between macro-level indicators (poverty, religion, quality of governance, female labor participation, and incarceration rates) and LVR/SHR, while controlling for highly developed nations, age, and gender. Next, the relationships between micro-level strains, a measure of frustration, social trust, religiosity, and LVR/SHR are investigated, while controlling for the proportion of males in the population. In these latter models, individual-level data are aggregated.

11.1 *Descriptive Statistics for WHO SHR and LVR and Main Indicators*

Table 14 shows descriptive results for SHR, LVR, as well as correlations between these indicators and the independent variables. The mean LVR is 17.64 (SD=14.35) per 100,000. SHR is positively correlated with quality of governance (r=.460, p<.001) and welfare (r=.289, p<.01). SHR is negatively correlated with infant mortality rate (r=-.692, p<.001), LVR (r=-.254, p<.05), percent youth (r=-.701, p<.001), and incarceration rate (r=-.297, p<.01). LVR is positively correlated with incarceration rate (r=.352, p<.01) and negatively correlated with quality of governance (r=-.221, p<.05) and sex ratio (r=.401, p<.001). Higher levels of poverty are related to lower SHR (or vice versa) but not to changes in the LVR. SHR is inversely related to incarceration rates. As the total sum of homicides and suicides increase, incarceration rates increase or vice versa. Higher lethal violence rates are linked to lower quality of governance. On the other hand, higher SHR is related to higher quality of governance. SHR and LVR are negatively correlated, indicating that nations that have higher suicide rates (compared to homicide rates) have lower levels of lethal violence, or vice versa.

Table 12. Descriptives and Bivariate Correlations between Main Indicators and Multiyear Average SHR and LVR (N=108)

	1) SHR	2) LVR	3) Infant mortality log	4) Gover-nance	5) Welfare log	6) Female labor	7) % Youth	8) M-F Sex Ratio	9) Incarceration rate
1) SHR									
2) LVR	-.254*								
3) Infant mortality log	-.692***	.137							
4) Governance	.460***	-.221*	-.790***						
5) Welfare log	.289**	-.003	-.381***	.359***					
6) Female labor	.115	.189+	-.126	.253*	.180+				
7) % Youth	-.701***	.075	.807***	-.648***	-.415***	-.217*			
8) M-F Sex Ratio	-.169	-.401***	.085	-.091	-.441***	-.318**	.261**		
9) Incarceration rate	-.297**	.352***	.260**	-.168+	-.087	-.049	.191+	-.354***	
Mean (SD)	.65 (.31)	17.64 (14.35)	13.76 (11.61)	.421 (.93)	6.72 (2.36)	49.31 (10.48)	.17 (.03)	98.80 (12.48)	200.52 (143.48)
N	93	93	105	108	105	102	105	105	107

Note: Means and standard deviations of original values (no transformations)
+p<.10, *p<.05, **p<.01, ***p<.001

11.1.1 *The Role of Influential Cases: Major Correlates of LVR, Disaggregated by Region*

       In the final investigation of the influence of outliers in correlation analyses, regional effects on the LVR are examined, as shown in *Table 15*.[13] Correlation analyses between LVR, infant mortality rate, welfare level, incarceration rate, and quality of governance are conducted, with outliers excluded. None of the indicators show stability across the regions. In fact, most of the indicators are not strongly correlated with the LVR. Only the quality of governance is related to the LVR in the full sample, but the relationship is mainly driven by Europe. The social control indicator, the percent female labor participation, correlates with suicide rates in Asia. Notably, increases in the percent female labor participation are related to increases in the LVR (or vice versa). Incarceration rates are only correlated with the LVR in Europe, suggesting that in this region punitiveness is linked to higher combined homicide and suicide rates.

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[13] These correlations are not carried out for SHR because it was used as a binary dependent variable in all of the analyses.

Table 13. Correlation Matrix by Region for Main Indicators in Macro LVR Model (N=98)

Region	N	Infant mortality rate (log) & LVR	Welfare (log) &LVR	Incarceration rate (log) & LVR	Governance & LVR	Female labor & LVR
Full Sample	98	.137	.170	.206[+]	-.216[*]	.207[+]
Africa	5	-.137	.158	.756	.888[*]	.975[*]
Americas	36	.272	-.078	-.175	-.289	-.387[+]
Latin (excl. US & Canada)	34	.235	-.008	-.202	-.250	-.353[+]
Asia	24	-.041	.318	.075	-.060	.532[*]
Europe	40	.203	-.308[+]	.443[**]	-.344[*]	.006

Note: +p<.10, *p<.05, **p<.01, ***p<.001

11.1.2 *Measures of Deprivation Predicting SHR: Logistic Regression with Multiple Imputation*

Results for the logistic SHR binary logistic regression model (n=92) are seen in *Table 16*.

In *Model 1*, poverty is related to high SHR; high SHR nations are more likely to have lower

levels of poverty (OR=.080, p<.05). Having higher SHR is also associated with having a lower

incarceration rate (OR=.130, p<.10). Notably, none of the variables were positively related to

SHR. FMI ranged between 2 percent and 3.8 percent, indicating that the precision of the

estimates is good. Overall, the main model is significant but not very strong (F=2.17, p<.05).

Model 2 examined the potential moderating effect of welfare in the relationship between infant

mortality rates and SHR. There is no direct effect of welfare on SHR, nor a moderation effect of

welfare on the link between poverty and SHR. This is a weaker model than the direct effects

model (F=1.95, p<05).

Table 14. Between-country Predictors of High Suicide-Homicide Ratio: Logistic Regression with Multiple Imputation (N= 92)

Variable	Model 1: Poverty			Model 2: Poverty with welfare*poverty moderator		
	B(SE)	Odds ratio	FMI	B(SE)	Odds Ratio	FMI
Infant mortality log	-2.520 (1.30)[*]	.080	.038	-2.548(1.31)[+]	.078	.084
HDI dummy	.346(.96)	1.413	.006	.327(.96)	1.387	.035
Quality of governance	.070(1.31)	1.073	.009	.074(1.32)	1.077	.008
Welfare log	-1.065(1.33)	.344	.021	-1.595(3.57)	.203	.037
Religion dummy	-.325(1.50)	.722	.002	-.313(1.50)	.731	.005
Female labor participation	.021(.071)	1.020	.003	.021(.071)	1.021	.010
% Youth	-1.328(18.78)	.265	.010	-1.087(18.80)	.337	.006
M-F Sex ratio	-.155(.11)	.856	.008	-.156(.11)	.855	.007
Incarceration log	-2.039(1.12)[+]	.130	.002	-1.960(1.19)	.141	.013
Infant mortality*welfare (centered, log)	--	--	--	-.444(2.69)	.641	.034
F-ratio	2.17[*]			1.95[*]		

Note: +p<.10, *p<.05, **p<.01, ***p<.001

11.2 *Suicide-Homicide Ratios: Stepwise Logistic Regression using Aggregated World Values Survey Data*

The main goal of this analysis is to observe the potential mediation of frustration at the country-level with variables in their aggregated forms (i.e., each cluster, or nation, had an aggregated mean of the individual level variable). However, because of a small suicide rate sample (n<40), it is not possible to conduct multilevel analyses. Because of the limited sample size and number of variables, stepwise analyses were conducted on the aggregated data. *Table 17* shows logistic regression results investigating the impact of micro-level variables on SHR. In the reduced model, *Model 1,* only one indicator is significant; low religiosity is related to high SHR (OR=.036, p<.001). In *Model 2*, the control variable and the indicators with the

higher p-values were removed (i.e., high male proportion and high frustration) to make a more

parsimonious model given the small sample size. The relationship between low religiosity and

high SHR persisted (OR=.032, p<.001). Overall, both models were quite poor in predicting SHR,

possibly due to the small sample size.[14]

Table 15. High SHR: Exact Logistic Regression using Aggregated WVS Data(N=42)

	Model 1 (Full)		Model 2 (Reduced)	
Variable	**B(SE)**	**Odds Ratio**	**B(SE)**	**Odds Ratio**
Med/High prop males	1.183(3.15)	3.266	1.408(4.06)	4.087
Med/High prop unemployment	1.002(2.89)	2.724	1.128(3.03)[+]	3.091
Med/High income	1.103(3.11)	3.012	1.386(4.30)	3.997
Med/High Prop div/sep[1]	-.532(.651)	.587	--	--
Med/High Religiosity[1]	-3.333(.05)[*]	.036	-3.427(.04)[**]	.032
Med/High Frustration[1]	1.125(3.37)	3.079	1.693(5.78)	5.441
High Prop trust[1]	-.358(.93)	.699	--	--
Model score (χ^2)	13.683*		13.269*	

[1]**Median unbiased estimate (MUE) because of infinite conditional maximum likelihood estimate (CMLE).**
Note: +p<.10, *p<.05, **p<.01, ***p<.001

[14] The mixed model (i.e., multilevel hypothesis 2) testing the relationship between macro-level indicators, frustration, and SHR was excluded because of redundancy. Due to the inability to conduct multilevel analyses, this model did not contribute to the understanding of lethal violence. The same was done for the similar LVR models.

11.3 *Measures of Deprivation Predicting LVR: Weighted Least Squares (WLS) with Multiple Imputation*

Table 18 presents the results from the multiply imputed weighted least squares (WLS) regression analyses predicting LVR. Two models were tested: poverty (infant mortality rate), and the moderating effects of welfare. These two models tested direct and indirect effects of welfare on lethal violence rates.

In *Model 1*, poverty is not related to the total sum of lethal violence. However, quality of governance is strongly associated with LVR. A higher level of quality of governance leads to lower levels of total violence (β =-.597, p<.01). Nations with one dominant religion have lower levels of LVR (β =-.595, p<.05). Welfare is linked to higher levels of lethal violence (β =.686, p<.05). Finally, percent female labor participation is strongly linked to the overall level of violence, such that a higher proportion of women in the workforce is associated with higher rates of lethal violence (β =.054, p<.001). Overall, the model is significant (F=9.97, p<.001) but the mean explained variance is very low for a model with this number of predictors (R^2=.400). Robust regression results show that most variables (i.e., quality of governance, nations with one dominant religion, female labor participation, and sex ratio) remain unchanged, suggesting very little impact of outliers on the coefficients. However, the level of welfare becomes marginally significant with the exclusion of outliers.

Model 2 presents the potential moderating effect of welfare on the relationship between infant mortality and LVR. All the covariates were very similar in strength and significance level to Model 1. However, there were no direct effects of welfare on suicide rates and no moderating effect of welfare on the relationship between poverty and LVR.

Table 16.Between-country Predictors of LVR: Weighted Least Squares with Multiple Imputation (N=93)

Variable	Poverty model(1) B(SE)	Poverty model w/ interaction(2) B(SE)
Infant mortality log	-.308(.27)	-.335(.27)
HDI dummy	-.073(.40)	-.022(.41)
Quality of governance	-.597(.19)**	-.599(.19)**
Welfare log	.686(.32)*	1.007(.47)*
Religion dummy	-.595(.28)*	-.607(.28)*
Fem labor	.054(.01)***	.054(.01)***
Youth	-.696(6.01)	-1.478(6.07)
Sex ratio	-.051(.02)*	-.049(.02)*
Incarceration	-.066(.16)	-.092(.16)
Infant*welfare (centered, log)	--	.414(.43)
F-ratio	9.97***	9.05***
Mean R²(adjusted)	.400(.334)	.401(.327)

+p<.10, *p<.05, **p<.01, ***p<.001

11.4 *Lethal Violence Rates: Stepwise Weighted Regression using Aggregated World Values Survey Data*

The following analyses aim to explore the potential mediating effect of frustration at the aggregate level with variables in their aggregated forms. However, because of a small suicide rate sample (n<40), it is not possible to conduct multilevel analyses. Because of the limited sample size and number of variables, stepwise analyses were conducted on the aggregated data.

In *Table 19*, results for the weighted stepwise regression for LVR (n=42) are presented. The stepwise regression analysis produced seven models in order to find the best fit for LVR. In the final model, *Model 7*, only the strain proportion divorced/ separated is significant. A higher proportion of divorced/separated individuals in the population lead to higher rates of lethal violence (β =.403, p<.05). The explained variance is very low at 13.8 percent. Even though the

overall model is significant, the model explains a limited amount of variance of LVR. Robust

regression results indicated that the only significant indicator in the stepwise model is strongly

affected by outliers. The proportion of individuals who are divorced/separated individuals in the

population is no longer significant, indicating that this is a very poor model.

Table 17. Lethal Violence Rates: Weighted Stepwise Regression using Aggregated WVS Data (N=42)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Variable	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)
Prop males	.097(4.67)	.115(4.26)	--	--	--	--	--
Prop unempl	.136(3.56)	.134(3.50)	.137(3.47)	--	--	--	--
Income level	.236(.24)	.235(.24)	.238(.23)	.248(.23)	--	--	--
Prop divorced/ sep	.358(5.87)+	.378(5.43)*	.369(5.37)+	.385(5.31)*	.448(5.21)*	.355(4.68)*	.403(4.62)*
Relig	-.355 (.37)+	-.341(.35)+	-.339(.35)+	-.314(.34)	-.345(.35)+	-.215(.29)	--
Frust	-.054(.56)	--	--	--	--	--	--
Prop trust	-.286(1.93)	-.276(1.88)	-.263(1.86)	-.318(1.77)	-.251(1.75)	--	--
F-ratio	1.829	2.189+	2.555*	3.071*	3.349*	4.297*	6.608*
R²(adjust-ed)	.314(.142)	.312(.169)	.299(.182)	.284(.191)	.239(.168)	.207(.159)	.163(.138)

Note: +p<.10, *p<.05, **p<.01, ***p<.001

11.5 *Summary*

This chapter investigated the impact of different types of strains and social controls in

analyses. The WLS models examined the effects of macro-level indicators on LVR while the

logistic models tested the impact of these variables on SHR. Poverty is a less consistent predictor of SHR, and is unrelated to LVR. Incarceration rates are marginally significant in predicting high SHR, indicating that nations with high SHR had lower imprisonment rates. Quality of governance is negatively and strongly linked to LVR, while percent female labor participation is linked to higher LVR. Welfare is also associated with higher levels of LVR. Finally, nations with 90 percent or more adhering to one religion tend to have lower LVR.

The analyses with aggregated micro indicators were generally weak. Results suggest that the proportion of individuals divorced and/or separated in the population is the only aggregated micro-level strain variable that predicted variations in LVR. Social control at the micro level also influenced suicide rates: Medium/high aggregate levels of individual religiosity led to lower SHR. Analyses in the three results chapters set out to identify whether similar underlying processes are linked to homicide and suicide. To further investigate these relationships the ratio of suicides to homicide and the total volume of lethal violence were included. Results clearly show that strains are more strongly related to homicide than suicide, but the effects of the institution of religion and religiosity are intricately related to variations in both homicide and suicide rates. Contrasts between different sets of analyses are discussed thoroughly in the discussion chapter.

Chapter 8: Discussion and Implications

The present study contributes to the interdisciplinary understanding of lethal violence by investigating a number of under-studied areas, focusing on the similarities and differences between homicide and suicide rates within a multilevel context and varying levels of development. First, this study draws on multilevel theories from different disciplinary backgrounds, highlighting the importance of theoretical integration. It offers the first operationalization and test of individual level frustration in the cross-national violence literature. Second, the potential confounding effects of level of development are explored. Prior studies have relied on samples of highly developed countries (Koeppel et al, 2013). This study illustrates how sensitive findings are to regional effects, particularly the influence of non-Western countries. Third, the current study is important to the field because this is the first multilevel analysis of individual level latent measures, namely frustration and religiosity, on homicide rates. Investigations of both concepts in the violence literature are scarce.

This chapter offers a summary of findings for homicide, suicide, SHR, and LVR analyses. First, a summary of key findings in relation to the research questions and hypotheses laid out in this study is presented. The implications of findings, as well as links to prior research, are also discussed. Finally, the limitations and implications of the findings are presented.

12.1 *Summary of Findings*

12.1.1 <u>*Research Question 1*</u>

Within the FA framework and drawing on strain theories, how do multilevel factors influence national homicide rates in a cross-national sample?

Macro-level Hypothesis 1:

Higher levels of macro strain are associated with higher homicide rates, irrespective of the level of development and controlling for social controls. The relationship between strain and homicide rates is attenuated by welfare.

Main Findings: The hypothesis is partly confirmed.

Poverty is a strong predictor of homicide rates (+), and higher levels of welfare led to higher homicide rates. Poverty remains a strong predictor across regions even when adjusting for outliers. However, welfare does not moderate the relationship between poverty and homicide rates. The unexpected non-significant finding is due to the regional variations in the relationship between welfare and homicide rates.

Multilevel Hypothesis 1:

At the national level, higher levels of micro strain are associated with higher homicide rates, net of the effects of social controls. The relationship between micro strain and homicide rates is mediated by aggregate-level frustration and moderated by trust.

Main Findings: The hypothesis was not supported.

None of the micro measures of strain (i.e., the proportions of unemployed and divorced or separated in the population, and mean individual income level) are significantly related to homicide rates. Higher levels of individual frustration are associated with lower homicide rates (-

). This is an unexpected finding because the FA hypothesis stipulates that strains lead to frustration and subsequently, higher levels of aggression. However, it is important to note that the sample size is limited with only 54 nations, and smaller effect sizes could possibly have gone undetected.

Multilevel Hypothesis 2:

At the national level, higher levels of macro strain lead to higher homicide rates, net of effects of social control and control variables. The relationship between macro strain and homicide rates is mediated by aggregate-level frustration and moderated by welfare.

Main Findings: The hypothesis is partially supported.

Findings are similar to the macro-level analysis in that poverty is strongly linked to homicide rates (+). The findings revealed that the link between individual frustration and homicide rates is in the opposite direction in the second multilevel model as well. The relationship is similar to the first multilevel hypothesis. However, any mediating effects of frustration could not be tested because the link between frustration and homicide is only marginally significant. Welfare does not moderate the relationship between poverty and homicide rates.

12.1.2 *Research Question 2*

Within the FA framework and drawing on strain theories, how do multilevel strain factors influence national suicide rates in a cross-national sample?

Macro-level Hypothesis 1:

Higher levels of macro strain lead to higher levels of suicide rates regardless of level of development, net of effects of social control, and control variables. The relationship between strain and suicide rates is attenuated by welfare.

Main Findings: The hypothesis is not confirmed.

Poverty is expected to increase suicide rates because it is a strain theoretically linked to frustration. While infant mortality rate is negatively associated with suicide rates in the WLS model, robust regression models indicate that this relationship is driven by outliers. Welfare does not predict suicide rates and there is no moderating effect on the relationship between poverty and suicide rates.

Importantly, it is impossible to infer the patterns of developing nations from the multivariate relationships. The suicide sample consists of no nations with low HDI, 18 nations with medium HDI, and the rest high or very high HDI. The findings from the suicide chapter should thus be interpreted as qualities of more developed/highly developed nations.

Multilevel Hypothesis 1:

At the national level, higher levels of micro strain are associated with higher suicide rates, net of the effects of social controls. The relationship between micro strain and suicide rates is mediated by aggregate-level frustration and moderated by trust.

Main Findings:

The hypothesis is partly supported. The proportion of individuals who are divorced or separated in the population predicted suicide rates (+). Contrary to theoretical expectations, frustration is not linked to changes in the suicide rates, which is likely due to the small sample size and type of

modeling. Trust is not associated with suicide rates and there are no moderating effects of this variable.

In conclusion, similar processes are expected to be related to both homicide and suicide rates. However, vastly different results are found. Macro strain is related to homicide but not suicide while the opposite is true for micro strain. Frustration is linked to homicide but not suicide. Social support is not strongly related to either form of violence. These findings reflect either potential real differences or methodological artifacts: smaller sample sizes for suicide models and different statistical modeling. Conversely, social control indicators are strongly linked to variations in both homicide and suicide rates.

12.1.3 _Research Question 3_

Within the FA framework and drawing on strain theories, how do multilevel strain factors influence suicide-homicide ratios (SHR) and lethal violence rates (LVR) in a cross-national sample?

Macro-level Hypothesis 1:

Higher levels of macro strain lead to higher levels of LVR regardless of level of development, net of effects of social control and control variables. Macro strain is not related to SHR. The relationship between strain and SHR and LVR is attenuated by welfare.

Main Findings: The hypothesis is partially supported.

High SHR nations have lower levels of poverty, while this indicator is unrelated to LVR; nations with more suicides are more likely to have fewer infant mortality deaths. The positive association between poverty and homicide supports this finding. Welfare is not related to SHR or

LVR and there is no moderating effect on the relationship for either type of lethal violence. Given that poverty is related differently to homicide and suicide, it is not surprising that strain fails to predict LVR.

Multilevel Hypothesis 1:

At the national level, higher levels of micro strain are associated with higher SHR and LVR, net of the effects of social controls. The relationship between micro strain and SHR and LVR is mediated by aggregate-level frustration. The relationship is also moderated by trust.

Main Findings: The hypothesis is partly confirmed.

A high proportion of individuals who are divorced or separated is linked to higher lethal violence rates, but related to lower suicide-homicide ratios. This finding suggests that nations with more social disintegration have higher levels of overall violence, but the violence is more likely to be homicides. Possibly due to modeling strategies, frustration is not associated with either outcome and there is no moderating effect of trust.

As a final mark, the primary aim of this research question is to explore the stream analogy model of lethal violence within the theoretical frameworks of FA hypothesis and strain theories. Macro strains are not associated with lethal violence rates or suicide-homicide ratios. Frustration is inconsistently related to lethal violence. Social support is related to higher lethal violence rates but it is not linked to SHR. There is no strong support for the stream analogy of violence model. This is due to the small sample size.

12.2 *Implications of the Findings for the Study of Lethal Violence*

12.2.1 *The persistent link between structural strain and externalized aggression across cultures*

The relationship between poverty and homicide rates is constant across different regions, suggesting that the effects of this type of strain are not culture-specific. Income inequality, for example, has erratic effects on homicide rates. The direction and significance level varies depending on region, suggesting that the effects of inequality on homicide may be culture-specific. According to the FA hypothesis, strains such as economic deprivation lead to higher homicide rates. People with blocked goals become frustrated, which leads to some form of aggression (Dollard et al., 1939). Inferring that strain results in frustration, Henry and Short (1954) argue that structural strains lead to increased homicide and suicide rates. The FA hypothesis does not explain the lack of a link between micro strain and homicide. However, this may be explained by GST's objective strains. The positive relationship between poverty and homicide rates and the non-significant relationship between micro strains and homicide rates are consistent with GST's objective strain. Although not all people view objective strains as negative (Froggio & Agnew, 2007), these strains are more strongly linked to aggregate homicide rates because there is an aggregate-level consent regarding what is considered a "disliked event or condition" (Agnew, 2006). In addition, macro-level strains are more relentless. On a macro level, more people are affected by objective strains (e.g., poverty) because they are related to many facets of society, such as the infrastructure and political system.

12.2.2 *Weak social bonds and suicide: a matter of development?*

Nations with a higher proportion of individuals who are divorced or separated tended to have higher suicide rates. Suicide findings are starkly different from the homicide chapter,

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suggesting that there may be different mechanisms for the two types of lethal violence. There is an indication that micro strain is more strongly related to suicide rates than homicide rates. The non-significant relationship between poverty and suicide is likely an artifact of lack of developing nations in the sample. The mean poverty rate differed drastically between the homicide and the suicide samples, further indicating the lack of nations with a low HDI in the suicide sample. The findings from the suicide chapter should thus be interpreted as qualities of more developed/highly developed nations.

At the micro level, individuals with weaker social attachments are more likely to commit suicide (Stack & Kposowa, 2011). Although GST is a crime theory, it can also be applied to study suicide. Measures of micro strain are based on subjective interpretations of these conditions as negative; they are also more related to criminal behavior than to subjective strains (Agnew, 2009). For example, only the person who is unemployed is directly exposed to the emotional effects of losing his/her job. Similarly, strain may be more strongly felt by the person experiencing a divorce or separation. In other words, subjective strains may be more situational. However, the null finding for macro strain is unexpected given strain theory of suicide.

12.2.3 *Less frustration but more outward violence: the role of Latin America*

Theoretically, higher levels of individual frustration should lead to higher levels of violence. Although the reported findings are contrary to what is hypothesized, frustration may be more strongly related to suicide or non-lethal violence. Given that the Latin American region has higher homicide rates than other regions and lower levels of individual frustration, these countries are likely driving the negative relationship between frustration and homicide rates. Frustration is negatively correlated (but not significant) with homicide rates in the full sample,

but in the sample excluding Latin America, the relationship is positive (though still not significant). Despite the lack of significant correlations, it is plausible to presume that Latin American countries confound the relationship between frustration and homicide.

The link between Latin America and homicide rates may be due to violence resulting from the high levels of alcohol consumption (Cole & Gramajo, 2009) or drug production (Fajnzylber et al., 2002), but it is unclear how frustration or lower well-being affects this relationship. Is it possible that the level of well-being in Latin America is not influenced by the extensive drug business? Cultural values supportive of violence, such as machismo, are associated with homicide rates in Latin America (Neapolitan, 1994). This explanation is arguably an oversimplification of Latin American culture because these nations greatly vary in cultural values and socioeconomic characteristics (Aebi & Linde, 2014). It is plausible to speculate that the impact of religion and the devotion to Catholicism is related to stronger feelings of content. Two of the most violent nations in the world, Mexico and Trinidad and Tobago, are among the least frustrated nations. They are also among the nations with individuals with the highest levels of religiosity. Roughly 80 percent of Mexico's population belongs to Catholicism while Trinidad and Tobago's population primarily belongs to Protestantism, Catholicism, and Hinduism. It may be that the influence of religion prevents frustration from developing and that lethal violence has a different mechanism (i.e., more instrumental in nature). On the other hand, it is likely that some of the homicides in Latin America are instrumental in nature. They could be motivated by political or drug-related events (Buvinic, Morrison, & Shifter, 1999). If many homicides are instrumental, frustration does not necessarily play a role. More research is required to better understand this complex relationship between frustration, religion, and violence, especially in Latin American countries.

Religion or religiosity may also affect the relationship between frustration and homicide rates. Correlations between frustration and religiosity revealed a positive association: countries with more religious citizens were also more frustrated (or vice versa). This finding contradicts the argument that strongly religious individuals may experience less frustration because they divert negative energy and feelings through religious worship or justify negative life events as being the results of some higher power. Instead, religiosity may produce frustration because of the restrictions put on devotees' lives, especially within more orthodox religions.

12.2.4 *Are the effects of healthcare spending on homicide dependent on government priorities?*

Correlations between welfare levels and homicide rates revealed regional differences: the relationship is negative in the Americas and Europe. Conversely, it is positive in Africa and Asia. A scatterplot revealed a cross pattern, leading to an overall non-significant correlation. The regional effects between macro social support (welfare) and homicide rates are reflected in the violence literature. Studies on the link between social support and homicide rates often use small and developed samples, usually finding an inverse relationship (Nivette, 2011). As discussed above, negative correlations were reported for the Americas and Europe, regions in which a majority of nations are highly developed.

The non-significant finding could be influenced by the measurement of social support and its similarities to the poverty measure. As would be expected, there is a positive relationship between poverty and welfare. Countries may spend money on healthcare for different reasons. For instance, the U.S. spends the highest percent of its GDP on healthcare compared to the rest of the world. Sierra Leone, a developing nation, is the second largest spender on healthcare. These two countries invest in their healthcare systems for different reasons: in the U.S., large

amounts are spent on health insurance while in Sierra Leone, money is spent on life-saving disease prevention. Thus, there are contextual effects of welfare. The non-significant relationship could also be a result of lagged effects of healthcare spending; it takes a substantial period of time for the effects to take place and influence the level of violence.

12.2.5 *Suicide: The unclear role of frustration, trust, and healthcare*

Because of the role of psychological distress, frustration is expected to be linked to suicide rates (Zhang et al., 2011; Dollard et al., 1939). It is likely that this non-significant finding is due to sample size and modeling. The study tested whether homicide and suicide were related to similar conditions in the context of frustration. However, this comparison is not entirely possible because of different modeling techniques. Multilevel analyses were not conducted due to small sample size and as a result, the modeling of frustration is different than the homicide models. The findings on macro level relationships reflect findings of other studies. The link between macro social support (welfare) and suicide rates is not as established in the suicide literature as in the homicide literature. Likewise, micro level social support did not emerge as a predictor of suicide. This study failed to capture true individual level processes. Not surprisingly, the role of interpersonal trust in suicide rates remains unexplored. Social support at the micro level is more strongly tied to suicide at the individual level.

12.2.6 *Differential effects of formal and informal social control on violence*

The role of social control in aggregate violence is unclear, though religion is consistently a major indicator, suggesting a common link between the two forms of lethal violence. The FA hypothesis posits that social control regulates residual aggression. Unexpectedly, perceived

quality of governance is not related to homicide rates, even though the extant literature indicates a link between different aspects of the government/political system and violence. Lower quality of governance, on the other hand, is related to higher suicide rates. However, there are some nations with higher suicide rates that have a lower quality of governance because they are transitioning between political systems, such as Russia and Eastern European countries. This is in line with Durkheim's argument that nations undergoing rapid social change are likely to also experience anomie, leading to higher suicide rates (Durkheim, 1897).

The FA hypothesis posits that frustration has similar effects on violence even if political structures vary (Dollard et al., 1939). The disparate finding for homicide rates is partly a result of regional differences in the relationship between the quality of governance and violence: The Americas, Asia, and Europe share the same inverse link. Interestingly, in Africa and Latin America the quality of governance did not affect homicide rates. The regional differences reflect the relationship between the political nature of a country and the direction of aggression. Communist/dictatorship nations are less individualistic and tend to turn violence outward because causes of frustration are blamed on others. Democracies are more individualistic and residents in these are more likely to turn blame inward for the same events. Consequently, collectivist nations have higher homicide rates while individualistic nations have higher suicide rates (Dollard et al., 1939).

The effects of religious institutions and level of religiosity on crime are based on different processes, and consequently are expected to have differential effects on violence. As argued by Lee (2006), "…where overall rates of adherence are low, the religious climate apparently has little discernible effect on the violent crime rate. The lack of a 'critical mass' of religiously oriented people undermines the reinforcement of norms and values prohibitive of norm and law

violating behavior" (Lee, 2006, p. 320). However, high levels of religiosity may not necessarily affect crime rates. Many theories that link religion and violence are based on the U.S. (e.g., social disorganization theory, strain theory, and institutional anomie theory). Some parts of the U.S. are diverse, but as a whole various forms of Christianity are predominant. For example, the percent of conservative Protestants is related to higher homicide rates in the Southern U.S. but not to other regions (Ellison et al., 2003). Therefore, it is difficult to extend these theoretical underpinnings to a global sample where an infinite number of religious variations exist.

Thus, predominance of one single religion in a nation is important in the context of homicide and suicide. These types of countries tended to be either Muslim or Catholic and were more likely to have lower homicide and suicide rates, supporting the thesis that religion protects against both homicide and suicide on a macro level. The lower violence rates may be a reflection of the strong social control that is exerted on individuals as a result of the religious homogeneity of these societies. These findings echo Durkheim's ideas –homogenous nations tend to have less violence (Durkheim, 1897). Additionally, both Islam and Catholicism explicitly prohibit suicide (Chen et al., 2012), perhaps reducing the acceptability of this form of lethal violence in these nations.

In addition, higher levels of individual religiosity were related to lower suicide rates, as supported by previous reseadissatrch (Fernquist, 2002; Durkheim, 1897). In contrast, this study found that individual religiosity is positively associated with homicide rates. Accordingly, in developed democracies, religiosity has been found to be related to increased homicide rates. The countries with the least religious individuals have better functioning societies in terms of lower levels of societal ills, such as homicide, abortion, and STDs (Paul, 2005). For instance, these patterns are observed in Sweden, which has the lowest level of mean individual religiosity in the

sample. Sweden has quite high suicide rates but low homicide rates. On the other hand, Jordan

had the highest level of mean religiosity and low homicide and suicide rates, suggesting that

Muslim nations may be exceptional cases. While the low suicide rates may be due to

underreporting, more research is needed to explore these disparate findings. This finding of

differential effects of religiosity on homicide and suicide depending on type of religion put into

question the applicability of the FA hypothesis and the stream analogy model of lethal violence

to Muslim nations.

Countries with higher incarceration rates also had higher homicide rates. This link is

found in both macro-level and the multilevel homicide analyses, indicating that this is a robust

indicator of homicide rates. This finding is consistent with prior research on homicide (Pratt &

Godsey, 2003). It is expected that homicide rates are lower in countries with higher incarceration

rates because of the social control it exerts on people. However, this type of coercive social

control may differentially influence citizens; in countries with high incarceration rates, residents

are certain to be punished. Thus social control may be related to certainty of punishment but not

severity. This concept relates to studies that have found that the use of the death penalty does not

deter homicide (Neumayer, 2003; Gartner, 1990). Another explanation for the positive

relationship between incarceration rates and homicide rates is that homicide perpetrators are

acting out on those exerting social control (Palmer, 1972), or that the state is responding to high

violence rates with more aggressive incarceration policies.

12.2.7 *Limited applicability of the stream analogy model of lethal violence*

Few indicators were related to LVR and SHR, offering weak support for the stream

analogy of lethal violence model. Poverty is related to higher SHR, reflecting findings similar to

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the homicide models. The findings on frustration are inconsistent because of methodological issues, such as sample size and reliance on dummy variables. As discussed earlier, there were strong regional differences in the relationship between social support and LVR. The link between macro social support (welfare) and suicide rates is not as established as in the homicide literature. This study failed to capture true individual level processes. Not surprisingly, the role of interpersonal trust in suicide rates remains unfounded. Social support at the micro level is more strongly tied to suicide at the individual level.

The FA hypothesis and the stream analogy model of lethal violence posit that countries are expected to be on the low or high end of the SHR spectrum. Therefore a negative correlation should occur between homicide and suicide rates and this is found in the current study. The correlation is weak but indicates that homicide and suicide are inversely related. This suggests that there is a trend for countries to have one predominant style of attribution: higher homicide rates mean people are externalizing aggression while higher suicide rates mean that people are internalizing aggression. This finding is also consistent with Durkheim. In societies with low social integration, a negative correlation occurs between homicide and suicide. In these instances "… homicide depends on opposite conditions … It is a violent act inseparable from passion" (Durkheim, 1951, p. 356). Furthermore, "… where homicide is very common it confers a sort of immunity against suicide" (Durkheim, 1951, p. 351), suggesting an inverse relationship between homicide and suicide at the aggregate level.

Some notable results emerged. Nations with a high proportion of religious individuals had lower SHR (more homicides than suicides). This finding supports Durkheim's suicide theory. He argued that religion protects against suicide but not homicide (Durkheim, 1897). Higher incarceration rates were related to higher SHR, indicating that nations with a high ratio of

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suicides to homicides were more punitive. The perceived quality of governance predicted lower lethal violence rates. It is not surprising that nations with perceived good quality of governance had lower levels of violence. Citizens may be more content and calm when their government is perceived as being just and well-functioning. A binary measure of high proportion of divorced and separated people is related to more homicides than suicides in a nation. The opposite relationship is observed for lethal violence: a higher proportion of individuals who were divorced or separated resulted in higher lethal violence rates. These findings are also in line with Durkheimian thinking. National trends on divorce and separation indicate that there is lack of social integration and the presence of anomic forces, all conducive to violence (Durkheim, 1897).

12.3 *Theoretical Contributions*

Research suggests that relative or absolute deprivation leads to higher levels of aggregate frustration, which then results in higher rates of violence. In relation to the FA hypothesis and the stream analogy model, it is theorized that concurrent with lower levels of income inequality and higher levels of development, individuals tend to blame themselves for negative events and direct aggression toward themselves. Therefore, suicide will be the predominant type of lethal violence in more developed nations. The relationship between poverty and suicide is unclear despite a number of studies (Iemmi et al., 2011). Suicide rates tend to be higher than homicide rates in developed nations, so it may be that the infant mortality rate is not a suitable measure of deprivation/strain in the context of suicide. It is also possible that in order to find a significant relationship between rates of infant mortality and suicide, a larger and more diverse sample is needed. Significance levels are often driven by effects in developed nations (Ouimet, 2012),

which is true in this study as well. Contrary to some theories, economic development is linked to lower suicide rates.

This study contributes to the violence literature because it goes beyond the inferential basis of frustration. Dollard and colleagues (1939) argued that frustration must be measured at the individual level but during this time there is no data for such an investigation. This study also went beyond Henry and Short's (1954) economic context, including a wider range of indicators to account for varying levels of development. However, an issue with the FA hypothesis is that lethal violence may not always be the result of frustration. There are situations where violence is instrumental. For example, the violence used in a drug context is likely not a cause of frustration, but instead a means to an end. Prior studies of the stream analogy model of lethal violence using cross-national samples have not employed poverty as an indicator of deprivation (Chon, 2013, Unnithan et al. 1994, Fernquist, 2002, He et al., 2003), while the current study did.

Results suggest that homicide and suicide should be studied together. The theories used, the FA hypothesis, GST, and the strain theory of suicide, were highly compatible in the context of lethal violence. Findings suggest that some general theories are not generalizable to countries of varying levels of development. Nevertheless, it is important to continue to explore how violence dynamics change in higher versus lower developed nations—and the implications for furthering general violence theories. One important proposition of GST could not be tested in most models: the mediating effect of negative affect on the relationship between strain and homicide rates and should be addressed in future research. Evidence for the stream analogy of violence draws on findings from the LVR models. Indicators that are related to LVR support the existence of a single stream of violence. Changes in the levels of poverty or development did not affect the overall lethal violence rate, but the perceived quality of government, predominance of

one religion, and female labor participation were associated with changes in the LVR, suggesting

robust effects of social control on the single stream of violence. The national proportion of

divorced or separated individuals, a micro strain, is related to increases in the LVR. As a result of

the inability to model frustration in multilevel analysis, the effects of frustration on the LVR

could not be adequately tested. Based on the evidence from this study, there is limited support

for the application of the stream analogy conceptualization of violence to the FA hypothesis and

strain theories.

12.4 *Methodological Contributions*

This study featured a number of methodological advances. First, this study used updated

and recent data from a variety of sources with countries from varying levels of development.

Second, a novel approach (multilevel analysis) is employed. Multilevel investigations of cross-

national processes are lacking in the violence literature. While there are challenges in modeling

these types of data, there is much to be gained from this approach. It enables the investigation of

data on different levels of analyses, and more importantly, with individual level data variances

within nations and between nations can be captured. In other words, inferences can be made

about the effects of key indicators at the country level and the cross-national level. Third, the

stream analogy model of lethal violence offers an innovative view of homicide and suicide that is

rarely explored. In the FA hypothesis, it is relevant to compare more than homicide and suicide

rates. The suicide-homicide ratio and lethal violence rate tests which indicators are related more

strongly to one type of violence over the other as well as the total "stream" of violence. Although

the SHR is challenging to model statistically, especially in smaller samples, the knowledge

gained from it cannot be overstated. Finally, to address the common issue of missing data in

cross-national research, multiple imputation by chained equations is used. This method is not yet common in violence research, although this study found that by conducting multiple imputation the interpretation of the coefficients did not change substantially. More importantly, sample sizes were increased at no cost of decreased validity. Cross-national samples are already limited because there are only approximately two hundred countries in the world. Therefore, efforts need to be made to increase sample size using this rigorous method.

12.5 *Contributions to Policy*

Lethal violence prevention is important and governments have been urged by both the United Nations and the World Health Organization to seriously address this concern. While governments play a significant role in reducing violence, research on this topic is crucial. Suicide is much more common than homicide in the world, yet focus remains on homicide. Part of the problem is the stigma attached to suicide in many regions of the world. From a practical viewpoint, findings from this study help to inform governments what area to focus on to address violence reduction and prevention. The results of this study indicate that social and individual indicators have differential impacts on homicide and suicide. As a result, recommendations for policy are tailored to the type of lethal violence.

12.5.1 *Homicide*

Homicide prevention begins with government efforts. Response strategies to homicide are different from suicide because the former is a crime that requires criminal justice intervention. Therefore, different government agencies are typically involved in the process of

investigating the two types of violence. The findings of this study indicate that poverty is a major contributor to higher homicide rates, in all regions—the Americas, Africa, Asia, and Europe.

Public Health. Poverty is measured based on the infant mortality rate. Countries with high infant mortality rates have a perceived lower level quality of governance. In these countries, governments spend less money on healthcare, suggesting shortcomings in the social infrastructure of these nations. Reductions in the infant mortality rate may not necessarily lower homicide rates. There is an intricate relationship between health and type of government. Countries with high infant mortality rates may be politically unstable because of internal conflict or change in political rule. Since these countries with high violence rates tend to invest less in healthcare, an increased investment of resources in healthcare services could potentially reduce both infant mortality and violence rates.

Criminal Justice. Homicide is not only a public health concern, but also a criminal justice issue. Findings showed that incarceration rates were linked to higher homicide rates, although these effects were regional. This relationship only held in Asia and Europe. One possible interpretation of this association is that incarceration does not have a deterrent effect on homicide offenders in these regions.

12.5.2 *Suicide*

This study did not find any robust predictors of suicide, perhaps due to the exclusion of health-related variables. Unlike homicide, and despite the fact that suicide is unlawful in some countries, it is primarily a public health issue. However, suicides are not a main priority for most governments. The first global suicide report was only published in 2014 by the WHO. This report suggests that the most effective method of reducing suicides needs to start by creating a

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government response, encouraging public discussions, and providing support for mental health issues.

Global suicide prevention efforts face major challenges. Alarmingly, only 28 countries have national suicide prevention strategies (WHO, 2015); this number highlights the important role of governments, particularly in developing nations, in responding to the increasing global rates of suicide. The lack of prevention programs has a clear connection with lack of suicide research. While violence, and especially suicide, is still a taboo subject in many nations, more research is needed to stimulate public debate on the issue and ultimately offer some help to victims and their families. National suicide prevention programs tend to be tailored to the needs of developed nations (Matsubayashi & Ueda, 2011); the lack of suicide prevention programs in less developed nations is a direct result of the lack of suicide research, highlighting the crucial practical implications of this type of research.

The WHO has a specific goal of reducing the suicide rates by 10 percent by 2020. A major strategy of the WHO's mission centers on limiting access to means of suicide, especially pesticide access in less developed nations (World Health Organization, 2014). Approximately 25 percent of all suicides around the world occur with the use of pesticides (WHO, 2006). Some types of pesticides have been found to induce mental illnesses, such as Parkinson's and Alzheimer's diseases (World Health Organization, 2015e). As a result, individuals who ingest pesticides and survive face additional mental health consequences, further complicating prevention efforts. Thus, government efforts can focus on preventing suicides by limiting access to means of suicide.

It may be difficult to clearly identify the cause of suicide. It is a combination of social, cultural and psychological factors. However, by decreasing the stigma associated with suicide,

steps can be undertaken to reduce suicide rates. At the community level, suicide is best addressed by targeting mental health. Focus on improving mental health services and offering counseling to individuals at risk as well as to families of victims are at the forefront of the battle against suicide. Japan is an excellent example of an effective government response to high suicide rates. The public outcry in response to the high suicide rates resulted in extensive government involvement in suicide reduction by enacting laws and creating prevention programs (World Health Organization, 2015a). This government response is likely very effective in beginning to break the taboo.

Some countries have criminalized suicide, significantly complicating prevention efforts. For instance, Nigeria reported an extremely low suicide rate of 0.09 per 100,000 persons in 2008. In Nigeria, suicide is labeled as an offense against persons and suicide data are included in official crime statistics. Lower suicide rates in countries that criminalize suicide are likely to be a result of reporting issues rather than actual reductions in suicides. Criminalization may further add to the stigma attached to suicide while failing to address this public health issue.

12.6 *Future Research on Lethal Violence*

Future research should employ large sample sizes using, if possible, multilevel design. Although large sample sizes are recommended, careful attention needs to be paid to regional versus global effects of relevant indicators on lethal violence. Ideally, scholars may eventually have access to comprehensive regional (within country) violence data, enabling advanced multilevel or spatial statistical modeling. Longitudinal studies would also be useful because lagged effects can be explored further. In addition to including unknown external causes of deaths, there ought to be more investigations of the effects of different types of non-lethal

violence (e.g., assault, rape) and covert aggression (e.g., hostile ideas or prejudice) within the FA hypothesis framework. Moreover, tests of other strains from strain theory of suicide (differential values, unattainable goals, and deficient coping) on suicide rates are recommended in the context of homicide.

Additionally, studies should further attempt to operationalize culture. There should be a specific emphasis on the relationship between religion and violence, particularly latent measures of religiosity, as well as the role of cultural heterogeneity, immigration, and alcohol drinking habits. In the context of social control, more coercive measures of social control should be utilized, such as prison sentence length and use of the death penalty. Future research should also integrate health perspectives in the context of both homicide and suicide.

Future studies should further explore the processes and dynamics in developing nations. Data availability is increasing and many countries are making their national level statistics available to the public. Nevertheless, suicide data from comparable sources are lacking. Patterns of internalizing or externalizing aggression are highly likely to play a role in homicide and suicide rates. What causes internalizing or externalizing aggression is dependent on a range of factors, including religion, political rule, and homogeneity of culture, and should be addressed further.

12.7 *Limitations*

While this dissertation makes a number of contributions to the body of violence research, a few limitations need to be acknowledged. First, the sample sizes (except the UN homicide data) range from adequate to midsized with different sample sizes for homicide and suicide. The analyses in this study were also limited by the WVS sample size (n=57). Small samples in cross-

national violence research are typical due to inconsistent data availability and quality. With small sample sizes come a number of statistical concerns, such as effect size and generalizability of findings. While the homicide analyses were able to better capture this, the models including suicide (i.e., suicide rates, SHR, and LVR) relied on exclusively medium and high HDI nations.

Unfortunately, WVS data cannot be pooled across waves because questions are not identical in each wave, making longitudinal analyses impossible. This is an issue inherent to the data. The non-significant relationship between micro strains and homicide rates could be an artifact of methodological issues. The null finding could also be related to the low frequency of the micro strain dummy variables. The distribution of observations is heavily skewed, which could impact the results. For example, the frequency for the unemployment variable is 9.5 percent. Stepwise modeling is not ideal. Because of the distribution of the SHR, the most suitable analysis is also extremely sensitive to sample size, skewness, outliers, and variables with little variation.

While the WHO publishes suicide estimates, there is no reassurance regarding the quality or reliability of these data. Some models were replicated using mortality estimates to assess the quality of suicide estimates; the results were dissimilar. As a result, it is decided not to jeopardize the validity of the results by using mortality estimates, even though they would have increased the sample size. Data quality is a major issue preventing suicide research with larger samples. The WHO reports that only 60 countries have "good" quality vital data on suicide (World Health Organization, 2015c). We have only just begun to scratch the surface of suicide in areas such as Africa.

Second, the data are cross-sectional. Cross-sectional data may be preferable for examining relationships between indicators such as poverty and homicide (Pare & Felson, 2014), but

perhaps not as appropriate when measuring frustration . This study used a time lag of one year between independent and dependent variables. However, frustration would ideally be studied over time because there may be a greater lag of effects than one year.

Third, the measurement of some indicators could be problematic. For example, frustration is not measured directly. None of the survey questions that were combined into a frustration index were measuring frustration directly. Instead the frustration measure should be viewed as a measure of dissatisfaction, a proxy for frustration. The alpha level of the indicator is not very strong but acceptable. Future research should further explore possibilities of measurement of frustration or other proxies, aiming for higher indicator reliability. Nevertheless, this study represents the first attempt to measure frustration in the context of cross-national lethal violence. Furthermore, the percent government spending on healthcare is not a good indicator of macro social support in the context of homicide, particularly not in the same model as the infant mortality rate. A wide range of measurements of social support have been employed in prior studies and there may be another one that is more consistent across different levels of development.

12.8 *Conclusion*

In conclusion, this dissertation aimed to examine the multilevel effects of a variety of important structural and psychological factors on violence, with a focus on the latent quality of frustration. The study sought to assess whether there is empirical support for the stream analogy model (i.e., same source of individual-level frustration for homicide and suicide), particularly across different cultural settings. While there is some support for the FA hypothesis, a larger sample is needed to confirm these relationships. This study outlined the need for continued

research on the applicability of the FA hypothesis and the stream analogy model of violence to homicide and suicide.

Violence research, and especially suicide research, is often based on samples that exclude developing nations. As a result, little is known about suicide trends in these countries. Knowledge about violence in developing nations is still lacking. Different strain mechanisms are linked to homicide and suicide rates, but lethal violence shares common bonds. Ultimately, lethal violence is a global concern of large proportions, yet much remains unknown about the underlying processes. Global citizens share similar concerns about everyday life including interpersonal relationships, finances, and work stress, but not all individuals resort to lethal violence to express their frustration. There are discernable patterns of variation in violence at all levels of analysis, and scholars must continue to investigate the complex threads woven together to better understand how and under what circumstances frustration is translated into lethal violence.

Appendix A: International Classification of Diseases (ICD) Mortality Codes

ICD Version	Cause of Death	Code
ICD-8[1]	Suicide and self-inflicted injury	A147: E950-959
ICD-8	Homicide and injury purposely inflicted by other persons; legal intervention	A148: E960-978
ICD-8	Injury undetermined whether accidentally or purposely inflicted	A149:E980-989
ICD-9[2,3,4]	Suicide and self-inflicted injury	B54:E950-959
ICD-9	Homicide and injury purposely inflicted by other persons	B55: E960-969
ICD-9	Injury undetermined whether accidentally or purposely inflicted	B560: E980-989
ICD-10[5]	Intentional self-harm Purposely self-inflicted poisoning or injury Suicide (attempted)	1101:X60-84
ICD-10	Assault Homicide; injuries inflicted by another person with intent to injure or kill, by any means	1102: X85-Y09
ICD-10	All other causes	1103: Y10-Y89

[1]Only data for Turkey

[2]Data for China represent less than 10% of all deaths

[3]External causes coded CH17 for Armenia, Belarus, Kazakhstan, Ukraine, USSR

[4]Special codes for China; suicide: C102:E950-959; homicide: C103:E960-969; ill-defined: C081:797-969

[5]Special codes for Portugal; assault: UE63; intentional self-harm: UE64; all other causes: UE65

[6]When reviewing the full list, it is apparent that there are some definitional differences between the ICD revisions. For example, ICD-8 and 9 include late effects of various injuries, self-inflicted and otherwise. For homicide and events of undetermined intent, both ICD revisions contain injuries from legal intervention, including legal executions. ICD-8 and 9 are quite similar while ICD-10 differs substantially. This more recent revision does not contain late effects in the homicide, suicide or undetermined intent categories. Late effects have their own categories. Additionally, injuries from legal intervention (also legal execution) have their own categories. Therefore, the violence mortality data from ICD-8/9 and ICD-10 may differ, especially in the transition years between ICD-9 and ICD-10.

Appendix B: List of Nations Included in the United Nations Homicide Data (N=187)

Afghanistan	Croatia	Ireland	Papua New	Taiwan
Albania	Cuba	Israel	Guinea	Tajikistan
Algeria	Cyprus	Italy	Paraguay	Thailand
Andorra	Czech Republic	Jamaica	Peru	The former
Angola	Democratic	Japan	Philippines	Yugoslav
Antigua and	People's	Jordan	Poland	Republic of
Barbuda	Republic of	Kazakhstan	Portugal	Macedonia
Argentina	Korea	Kenya	Puerto Rico	Timor Leste
Armenia	Democratic	Kiribati	Qatar	Togo
Australia	Republic of the	Kuwait	Republic of	Tonga
Austria	Congo	Kyrgyzstan	Korea	Trinidad and
Azerbaijan	Denmark	Lao People's	Republic of	Tobago
Bahamas	Djibouti	Democratic	Moldova	Tunisia
Bahrain	Dominica	Republic	Romania	Turkey
Bangladesh	Dominican	Latvia	Russian	Turkmenistan
Barbados	Republic	Lebanon	Federation	Uganda
Belarus	Ecuador	Lesotho	Rwanda	Ukraine
Belgium	Egypt	Liberia	Saint Kitts and	United Arab
Belize	El Salvador	Libya	Nevis	Emirates
Benin	Equatorial	Lithuania	Saint Lucia	United Kingdom
Bermuda	Guinea	Luxembourg	Saint Vincent	United Republic
Bhutan	Eritrea	Macau	and the	of Tanzania
Bolivia	Estonia	Madagascar	Grenadines	United States of
Bosnia and	Ethiopia	Malawi	Samoa	America
Herzegovina	Fiji	Malaysia	Sao Tome and	Uruguay
Botswana	Finland	Mali	Principe	Uzbekistan
Brazil	France	Malta	Saudi Arabia	Vanuatu
Brunei	Gabon	Mauritania	Senegal	Venezuela
Darussalam	Gambia	Mauritius	Serbia	(Bolivarian
Bulgaria	Georgia	Mexico	Seychelles	Republic of)
Burkina Faso	Germany	Mongolia	Sierra Leone	Viet Nam
Burundi	Ghana	Montenegro	Singapore	Yemen
Cabo Verde	Greece	Morocco	Slovakia	Zambia
Cambodia	Grenada	Mozambique	Slovenia	Zimbabwe
Cameroon	Guatemala	Myanmar	Solomon Islands	
Canada	Guinea	Namibia	Somalia	
Central African	Guinea-Bissau	Nepal	South Africa	
Republic	Guyana	Netherlands	Spain	
Chad	Haiti	New Zealand	Sri Lanka	
Chile	Honduras	Nicaragua	Sudan	
China	Hong Kong	Niger	Suriname	
Colombia	Hungary	Nigeria	Swaziland	
Comoros	Iceland	Norway	Sweden	
Congo, rep	India	Oman	Switzerland	
Costa Rica	Indonesia	Pakistan	Syrian Arab	
Cote d'Ivoire	Iran	Panama	Republic	

Appendix C: List of Nations Included in the World Health Organization Homicide and Suicide Data (N=108)

Albania	Guyana	Saudi Arabia
Antigua and Barbuda	Hong Kong	Serbia
Argentina	Hungary	Seychelles
Armenia	Iceland	Singapore
Australia	Ireland	Slovakia
Austria	Israel	Slovenia
Azerbaijan	Italy	South Africa
Bahamas	Jamaica	Spain
Bahrain	Japan	Sri Lanka
Barbados	Jordan	Suriname
Belarus	Kazakhstan	Sweden
Belgium	Kuwait	Switzerland
Belize	Kyrgyzstan	Tajikistan
Bermuda	Latvia	Thailand
Bolivia	Lithuania	The former Yugoslav
Bosnia and Herzegovina	Luxembourg	Republic of Macedonia
Brazil	Malaysia	Trinidad and Tobago
Brunei Darussalam	Malta	Turkey
Bulgaria	Mauritius	Ukraine
Canada	Mexico	United Kingdom
Chile	Montenegro	United States of America
Colombia	Morocco	Uruguay
Costa Rica	Netherlands	Uzbekistan
Croatia	New Zealand	Venezuela (Bolivarian
Cuba	Nicaragua	Republic)
Cyprus	Norway	
Czech Republic	Oman	
Denmark	Panama	
Dominica	Paraguay	
Dominican Republic	Peru	
Ecuador	Philippines	
Egypt	Poland	
El Salvador	Portugal	
Estonia	Puerto Rico	
Fiji	Qatar	
Finland	Republic of Korea	
France	Republic of Moldova	
Georgia	Romania	
Germany	Russian Federation	
Greece	Saint Kitts and Nevis	
Grenada	Saint Lucia	
Haiti	Saint Vincent and the	
Guatemala	Grenadines	

Appendix D: List of Nations Included in the World Values Survey (WVS) in Wave 5
(N=57)

4008	Andorra	2310	Mexico
2020	Argentina	1310	Morocco
5020	Australia	4210	Netherlands
2070	Brazil	5150	New Zealand
4030	Bulgaria	4220	Norway
1035	Burkina Faso	2370	Peru
2090	Canada	4230	Poland
2120	Chile	3325	Republic of Korea
3068	China	4260	Republic of Moldova
2130	Colombia	4270	Romania
3080	Cyprus	4272	Russian Federation
1125	Egypt	1370	Rwanda
1140	Ethiopia	4273	Serbia
4070	Finland	4276	Slovenia
4080	France	1430	South Africa
4084	Georgia	4280	Spain
4085	Germany	4290	Sweden
1180	Ghana	4300	Switzerland
2250	Guatemala	3070	Taiwan
3090	Hong Kong	3380	Thailand
3100	India	2440	Trinidad and Tobago
3110	Indonesia	3400	Turkey
3130	Iran	4303	Ukraine
3140	Iraq	4308	United Kingdom
4180	Italy	2450	United States of America
3160	Japan		
3170	Jordan	2460	Uruguay
3236	Malaysia	3408	Viet Nam
1280	Mali	1560	Zambia

Appendix E: Descriptive Statistics for the World Values Survey (WVS) in Wave 5 (N=57)

Items	Mean(SD)/%	Min	Max	Missing %
Life satisfaction	4.288(2.34)	1	10	1.2%
Freedom	3.979(2.32)	1	10	2.6%
Financial satisfaction	5.211(2.47)	1	10	4.9%
Happiness		1	4	1.1%
Very happy	28.2%	-	-	-
Quite happy	53.8%	-	-	-
Not very happy	15.1%	-	-	-
Not happy At all	2.9%	-	-	-
Male	47.9%	-	-	.1%
Trust most people	26.1%	-	-	3.8%
How important is god in your life	7.79(2.99)	1	10	2.4%
Religion important		1	4	5.5%
Not at all important	11.3%	-	-	-
Not very important	17.2%	-	-	-
Rather important	22.5%	-	-	-
Very important	49.0%	-	-	-
How often do you attend religious services?		1	6	7.0%
Never	20.6%			
Less often	10%			
Once a year	5.4%			
Only holy days	14.4%			
Once a month	10.1%			
Once a week	17.2%			
More than once A week	15.3%			

Descriptive Statistics for the World Values Survey (WVS) in Wave 5 (N=57)

Scale of income	-	-	10.0%
Lower step	10.4%	-	-	-
Second step	11.3%	-	-	-
Third step	13.3%	-	-	-
Fourth step	13.8%	-	-	-
Fifth step	17.8%	-	-	-
Sixth step	12.4%	-	-	-
Seventh step	9.6%	-	-	-
Eight step	6.0%	-	-	-
Ninth step	2.7%	-	-	-
Tenth step	2.6%	-	-	-
Marital Status		1	6	.3%
Single, never married	25.2%			
Widow	6.2%			
Separated	1.9%			
Divorced	3.3%			
Living as married	8.1%			
Married	55%			
Employment status		1	8	4.3%
Full-time	31.6%			
Part-time	7.0%			
Self-Employed	11.9%			
Retired	12.0%			
Housewife	14.1%			
Student	7.4%			
Unemploy-ed	9.5%			
Other	2.3%			
Age	41.41(16.48)	15	98	.3%

Appendix F: Correlation Matrix for Aggregated WVS Indicators and Homicide, Suicide, SHR, and LVR

	Homi-cide[1]	Homi-cide[2]	Suicide	SHR	LVR	Frust-ration	Religio-sity	Age	Income
Homi-cide[1]									
Homi-cide[2]	.906***								
Suicide	-.179	-.055							
SHR	-.733***	-.681***	.517**						
LVR	.516***	.675***	.699***	-.106					
Frust-ration	-.169	-.201	.173	.141	.011				
Religio-Sity	.526***	.459**	-.464**	-.758***	-.069	.240+			
Age	-.500***	-.456**	.372*	.779***	-.052	-.277*	-.666***		
Income	-.370*	-.327*	.306+	.308+	-.012	-.264+	-.286*	.175	

Note: [1] Data from the United Nations; [2] Data from the World Health Organization
+p<.10, *p<.05, **p<.01, ***p<.001

Table: Factor Analysis for WGI Political Factors (2007; α=.961)

Quality of Governance Items	Factor 1 Loadings
Voice and Accountability	.970
Political Stability and Absence of Violence	.740
Government Effectiveness	.934
Regulatory Quality	.972
Rule of Law	.809
Control of Corruption	.960
Eigenvalue	5.042
Percent of Variance	84.04

Table: Factor Analysis for Religiosity Index from WVS (α=.727)

WVS Items	Factor 1 Loadings
Importance of Religion	.862
Importance of God	.832
Religious Attendance	.646
Eigenvalue	2.212
Percent of Variance	73.74

Table : Factor Analysis for Frustration Indicator from WVS (α=.670)

WVS Items	Factor 1 Loadings
Life satisfaction	.856
Feelings of freedom	.450
Happiness	.579
Financial satisfaction	.636
Eigenvalue	2.19

Appendix H: Summary of Findings with Theoretical Implications

Chapter	Analysis/Model	Variables (Direction)	Theoretical Implications
Homicide	WLS UN Homicide Rate	**Infant mortality rate** (+) **HDI dummy** (+) Quality of governance (ns) **Welfare log** (+) **Religion dummy** (-) % Female labor participation (ns) **Incarceration rate log** (+) % Youth squared (ns) **M-F Sex Ratio** (-) **Latin America dummy** (+) Infant*welfare (ns)	FA hypothesis: Frustrations of poverty lead to increased aggression → higher homicide rates Social control → both increase and decrease homicide rates GST: Strains of poverty lead to increased crime rates → higher homicide rates Social support: Higher welfare levels → higher homicide rates No moderation of welfare between poverty and homicide rates
	ML-SEM UN Homicide Rate (Micro)	Prop males (ns) Unemployment dummy (ns) Income scale (ns) Divorced/separated dummy (ns) **Religiosity** (+) Trust dummy (ns) **Frustration** (-)	FA hypothesis: Aggregated micro level strain → not related to homicide rates Some strains lead to increased frustrations Higher levels of frustration → lower levels of homicide GST: Aggregated micro level strain → not related to crime rates No mediation of frustration between strain and crime Social support: Aggregated micro level trust→ not related to homicide rates No moderation of trust between strain and homicide rates

	ML-SEM UN Homicide Rate (Mixed)	**% Youth (ns)** Latin America dummy (+) Infant mortality (+) **% Unemployed (ns)** **Religion dummy (ns)** Incarceration rates (+) **Welfare (ns)** Frustration (-)	**FA hypothesis:** **Frustrations of poverty lead to increased aggression → higher homicide rates** **Social control → increase homicide rates** **Higher level of frustrations → lower homicide rates**
			GST: Strain → increased crime rates No mediation of frustration between strain and crime
			Social support: No relationship between welfare and homicide rates No support for moderating relationship
Suicide	WLS WHO Suicide Rate	**Infant mortality rate (-) → ns** HDI dummy (ns) **Quality of governance (-)** Welfare log (ns) **Religion dummy (-)** **% Female labor participation (+)** Incarceration rate log (ns) **% Youth squared (-)** **M-F Sex Ratio (-)** Infant*welfare (ns)	FA hypothesis: Frustrations of poverty lead to increased aggression → higher suicide rates Social control → decrease suicide rates
			Strain theory of suicide: Strain → decreased suicide rates
			Social support: No relationship between welfare and suicide rates No support for moderating relationship
	Weighted Stepwise Regression WHO Suicide Rate	Prop males (ns) Unemployment dummy (ns) Income scale (ns) **Divorced/separated dummy (+)** **Religiosity (-)** Trust dummy (ns) Frustration (ns)	FA hypothesis: Aggregated micro level strain → increased suicide rates Frustration not related to suicide rates Social control→ lower levels of suicide
			Strain theory of suicide: Strain →increased suicide rates
			Social support: Aggregated micro level trust→ not related to suicide rates No moderation of trust between strain and suicide rates

SHR	**Logistic regression WHO SHR**	**Infant mortality rate (ns)** **HDI dummy (ns)** **Quality of governance (ns)** **Welfare log (ns)**	**FA hypothesis:** **Macro strain unrelated to the suicide-homicide ratio** **Social control → decrease suicide-homicide ratio**
		Religion dummy (-) % Female labor participation (-) Incarceration rate log (-) % Youth squared (-) M-F Sex Ratio (-)	Strain theory of suicide: Strain is unrelated to suicide-homicide ratio
			Social support: No relationship between welfare and suicide-homicide ratio
		Infant*welfare (ns)	No support for moderating relationship
	Exact Logistic Regression WHO SHR Rate	Reduced micro model High proportion male dummy (ns)	FA hypothesis: Frustrations from strain → higher suicide-homicide ratio
		High unemployment dummy (+)	Frustration is unrelated to suicide-homicide ratio
		High income dummy (ns)	Social control → decrease suicide-homicide ratio
		High divorced/separated dummy (-)	Strain theory of suicide: Strain is unrelated to suicide-homicide ratio
		High religiosity dummy (-)	Social support: No relationship between welfare and suicide-homicide ratio
		Trust dummy (ns) High frustration dummy	No support for moderating relationship
LVR	WLS WHO LVR	Infant mortality rate (ns) HDI dummy (ns)	FA hypothesis: Strain is unrelated to lethal violence rates
		Quality of governance (-)	Social control → decrease and increase lethal violence rates
		Welfare log (+) **Religion dummy (-)** **% Female labor**	GST/Strain theory of suicide: Strain is unrelated to lethal violence rate
		participation (+) Incarceration rate log (ns) % Youth (ns)	Social support: Higher welfare → higher levels of lethal violence rates
		M-F Sex Ratio (-) Infant*welfare (ns)	No support for moderating relationship

Summary of Findings with Theoretical Implications (continued)

Weighted Stepwise Regression WHO LVR	<u>Reduced micro model</u> Prop males (ns) Unemployment (ns) dummy Income scale (ns) **Proportion divorced/separated (+)** ~~Religiosity~~ Trust dummy (ns) Frustration (ns)	FA hypothesis: Aggregated micro strain → higher lethal violence rates Frustration not related to lethal violence rates Social control not related to lethal violence rates GST/Strain theory of suicide: Aggregated micro strain → higher lethal violence rates Social support: Higher welfare → higher levels of lethal violence rates No support for moderating relationship

REFERENCES

Agnew, R. (1992). Foundation for a general strain theory of crime and delinquency. *Criminology, 30*, 47-87.

Agnew, R. (2001). Building on the foundation of general strain theory: Specifying the types of strain most likely to lead to crime and delinquency. *Journal of Crime and Delinquency 38*, 319-361.

Agnew, R. (2006). *Pressured into crime: An overview of general strain theory*. USA: Oxford University Press.

Agnew, R. (2009). General Strain Theory. In M. D. Krohn, A. J. Lizotte, & G. P. Hall (Eds.), *Handbook on Crime and Deviance* (pp. 169-185): Springer New York.

Agnew, R., & DeLisi, M. (2012). General strain theory, the criminal justice system and beyond: Introduction to the special issue. *Journal of Criminal Justice, 40*(3), 174-175.

Altheimer, I. (2008). Social support, ethnic heterogeneity, and homicide: A cross-national approach. *Journal of Criminal Justice, 36*(2), 103-114.

Andrés, A. R. (2005). Income inequality, unemployment and suicide: A panel data analysis of 15 European countries. *Applied Economics, 37*(4), 439-451.

Antonaccio, O., & Tittle, C. R. (2007). A Cross-national test of Bonger's theory of criminality and economic conditions. *Criminology, 45*(4), 925-958.

Bando, D. H., Brunoni, A. R., Benseñor, I. M., & Lotufo, P. A. (2012). Suicide rates and income in São Paulo and Brazil: a temporal and spatial epidemiologic analysis from 1996 to 2008. *BMC Psychiatry, 12*, 127-127.

Barber, N. (2006). Why is violent crime so common in the Americas? *Aggressive Behavior, 32*(5), 442-450.

Barriga, A. Q., Landau, J. R., Stinson, B. L., Liau, A. K., & Gibbs, J. C. (2000). Cognitive distortion and problem behaviors in adolescents. *Criminal Justice and Behavior, 27*(1), 36-56.

Batton, C., & Jensen, G. (2002). Decommodification and homicide rates in the 20th-century United States. *Homicide Studies, 6*(1), 6.

Beaulieu, M., & Messner, S. F. (2010). Assessing changes in the effect of divorce rates on homicide rates across large U.S. cities, 1960-2000: Revisiting the Chicago school. *Homicide Studies, 14*(1), 24-51.

Bennett, R. R. (1991). Development and crime: A cross-national, time-series analysis of competing models. *The Sociological Quarterly, 32*(3), 343-363.

Bennett, R. R., & Lynch, J. P. (1990). Does a difference make a difference? Comparing cross-national crime indicators. *Criminology, 28*(1), 153-181.

Berkowitz, L. (1988). Frustrations, appraisals, and aversively stimulated aggression. *Aggressive Behavior, 14*(1), 3-11.

Berkowitz, L. (1989). Frustration-aggression hypothesis: examination and reformulation. *Psychological Bulletin, 106*(1), 59.

Bjerregaard, B., & Cochran, J. K. (2008). A cross-national test of institutional anomie theory: Do the strength of other social insitutions mediate or moderate the effects of the economy on the rate of crime? *Western Criminology Review, 9*(1), 31-48.

Bliese, P. D., Chan, D., & Ployhart, R. E. (2007). Multilevel Methods: Future Directions in Measurement, Longitudinal Analyses, and Nonnormal Outcomes. *Organizational Research Methods, 10*(4), 551-563.

Blumstein, A., & Rosenfeld, R. (1998). Explaining Recent Trends in U.S. Homicide Rates. *The Journal of Criminal Law and Criminology (1973-), 88*(4), 1175-1216.

Braithwaite, J. (1989). *Crime, shame and reintegration*: Cambridge University Press.

Brauer, J. R., Antonaccio, O., & Tittle, C. R. (2013). Does religion suppress, socialize, soothe, or support? Exploring religiosity's influence on crime. *Journal for the Scientific Study of Religion, 52*(4), 753-774.

Brezina, T. (2010). Anger, attitudes, and aggressive behavior: Exploring the affective and cognitive foundations of angry aggression. *Journal of Contemporary Criminal Justice, 26*(2), 186-203.

Burr, J. A., McCall, P. L., & Powell-Griner, E. (1994). Catholic religion and suicide: The mediating effect of divorce. *Social Science Quarterly*.

Buvinic, M., Morrison, A., & Shifter, M. (1999). Violence in Latin America and the Caribbean: a framework for action: Inter-American Development Bank.

Cao, L., Zhao, R., Ling, R., & Zhao, J. (2009). Social support and anomie: A multilevel analysis of anomie in Europe and North America. *International Journal of Offender Therapy and Comparative Criminology, 54*(4), 625-639.

Central Intelligence Agency. (2014).   Retrieved June 1, 2014, from www.cia.gov/library/publications/the-world-factbook/index.html

Chamlin, M. B., & Cochran, J. K. (1997). Social altruism and crime. *Criminology, 35*(2), 203-226.

Chen, J., Choi, Y. J., Mori, K., Sawada, Y., & Sugano, S. (2012). Socio-Economic Studies On Suicide: A Survey. *Journal of Economic Surveys, 26*(2), 271-306.

Chon, D. S. (2012). The impact of population heterogeneity and income inequality on homicide rates: A cross-national assessment. *International Journal of Offender Therapy & Comparative Criminology, 56*(5), 730-748.

Chon, D. S. (2013). Economic development, change of age distribution, and stream analogy of homicide and suicide: A cross-national assessment. *Justice Quarterly, 30*(1), 169-193.

Cole, J. H., & Gramajo, A. M. (2009). Homicide rates in a cross-section of countries: evidence and interpretations. *Population and Development Review, 35*(4), 749-776.

Colucci, E., & Martin, G. (2008). Religion and spirituality along the suicidal path. *Suicide and Life-Threatening Behavior, 38*(2), 229-244.

Croon, M. A., & van Veldhoven, M. J. P. M. (2007). Predicting group-level outcome variables from variables measured at the individual level: A latent variable multilevel model. *Psychological Methods, 12*(1), 45-57.

Czepiel, S. A. (2002). Maximum likelihood estimation of logistic regression models: theory and implementation. *Available at czep. net/stat/mlelr. pdf*.

Dasandi, N. (2013). International Inequality and World Poverty: A Quantitative Structural Analysis. *New Political Economy, 19*(2), 201-226.

Dollard, J., Doob, L. W., Miller, N. E., Mowrer, O. H., & Sears, R. R. (1939). *Frustration and Aggression*. New Haven: Yale University Press.

Duncan, S. C., Duncan, T. E., & Strycker, L. A. (2002). A multilevel analysis of neighborhood context and youth alcohol and drug problems. *Prevention Science, 3*(2), 125-133.

Durkheim, E. (1947 [1893]). *The division of labor in society*. New York, NY: Free Press.

Durkheim, E. (1951[1897]). *Suicide* (J. S. a. G. Simpson, Trans.). New York, NY: Free Press.

Elgar, F., & Aitken, N. (2011). Income inequality, trust and homicide in 33 countries. *European Journal of Public Health, 21*(2), 241-246.

Esmail, A. M., Penny, J., & Eargle, L. A. (2013). The impact of culture on crime. *Race, Gender & Class, 20*(1/2), 326-343.

Fajnzylber, P., Lederman, D., & Loayza, N. (2002). What causes violent crime? *European Economic Review, 46*(7), 1323-1357.

Faupel, C. E., Kowalski, G. S., & Starr, P. D. (1987). Sociology's one law: religion and suicide in the urban context. *Journal for the Scientific Study of Religion*, 523-534.

Feierabend, I. K., Feierabend, R. L., & Nesvold, B. A. (1973). The comparative study of revolution and violence. *Comparative Politics, 5*(3), 393-424.

Felson, R. B., Osgood, D. W., Horney, J., & Wiernik, C. (2012). Having a bad month: General versus specific effects of stress on crime. *Journal of Quantitative Criminology, 28*(2), 347-363.

Fernquist, R. M. (2002). Lethal violence rates and suicide-homicide ratios in 21 developed countries, 1955-1994: How different are LVR and SHR from suicide and homicide rates? *Archives of Suicide Research, 6*(3), 237-247.

Ferri, E. (1883-84). *Omicidio-Suicidio*. Turin: Fratelli Brocca.

Fiala, R., & LaFree, G. (1988). Cross-national determinants of child homicide. *American Sociological Review*, 432-445.

Forbes, K. J. (2000). A Reassessment of the Relationship Between Inequality and Growth. *American Economic Review, 90*(4), 869-887.

Foucault, M. (1977). *Discipline and punish: The birth of the prison*. New York: Random House.

Freud, S. (1920). Beyond the pleasure principle. *The standard edition of the complete psychological works of Sigmund Freud, 18*, 1920-1922.

Froggio, G., & Agnew, R. (2007). The relationship between crime and "objective" versus "subjective" strains. *Journal of Criminal Justice, 35*(1), 81-87.

Fukuyama, F. (2001). Social capital, civil society and development. *Third world quarterly, 22*(1), 7-20.

Gartner, R. (1990). The victims of homicide: A temporal and cross-national comparison. *American Sociological Review, 55*(1), 92-106.

Gartner, R. (1991). Family structure, welfare spending, and child homicide in developed democracies. *Journal of Marriage and the Family*, 231-240.

Gartner, R., Baker, K., & Pampel, F. C. (1990). Gender stratification and the gender gap in homicide victimization. *Social Problems*, 593-612.

Gerdtham, U.-G., & Ruhm, C. J. (2006). Deaths rise in good economic times: Evidence from the OECD. *Economics & Human Biology, 4*(3), 298-316.

Gold, M. (1958). Suicide, Homicide, and the Socialization of Aggression. *American Journal of Sociology, 63*(6), 651-661.

Griffin, M. A. (1997). Interaction between individuals and situations: Using HLM procedures to estimate reciprocal relationships. *Journal of Management, 23*(6), 759-773.

Gruenewald, J., & Pridemore, W. (2012). A Comparison of Ideologically-Motivated Homicides from the New Extremist Crime Database and Homicides from the Supplementary Homicide Reports Using Multiple Imputation by Chained Equations to Handle Missing Values. *Journal of Quantitative Criminology, 28*(1), 141-162.

Halpern, D. (2001). Moral Values, Social Trust and Inequality Can Values Explain Crime? *British Journal of Criminology, 41*(2), 236-251.

He, N., Cao, L., Wells, W., & Maguire, E. R. (2003). Forces of production and direction a test of an expanded model of suicide and homicide. *Homicide Studies, 7*(1), 36-57.

Helliwell, J. F. (2007). Well-being and social capital: Does suicide pose a puzzle? *Social Indicators Research, 81*(3), 455-496.

Henry, A. F., & Short, J. F. (1954). *Suicide and homicide: some economic, sociological and psychological aspects of aggression* (Vol. 91442). New York: Free Press

Hirschi, T. (2009). *Causes of delinquency*. Piscataway, New Jersey: Transaction Publishers.

Huang, W. S. W. (1995). A Cross-National Analysis on the Effect of Moral Individualism on Murder Rates. *International Journal of Offender Therapy and Comparative Criminology, 39*(1), 63-75.

Iemmi, V., Coast, E., Leone, T., & McDaid, D. (2011). *Suicide and poverty: mapping the evidence in low and middle income countries*. Paper presented at the World Congress of the World Federation for Mental Health, Cape Town, South Africa.

Inagaki, K. (2010). Income Inequality and the Suicide Rate in Japan: Evidence from Cointegration and LA-VAR. *Journal of Applied Economics, 13*(1), 113-133.

Institute for digital reserach and education UCLA. (2015). Annotated SPSS output factor analysis.   Retrieved January 30, 2015, from http://www.ats.ucla.edu/stat/spss/output/factor1.htm

International Labour Office. (2013).   Retrieved September 15, 2013, from www.ilo.org/global/about-the-ilo/lang--eng/index.htm

James, C. (1990). Foundations of social theory. *Cambridge, MA: Belknap*.

Jang, S. J., & Lyons, J. A. (2006). Strain, social support, and retreatism among African Americans. *Journal of Black Studies, 37*(2), 251-274.

Jensen, G. (2006). Religious cosmologies and homicide rates among nations: A closer look. *Journal of Religion and Society, 8*, 2006-2007.

Johansson, S. E., & Sundquist, J. (1997). Unemployment is an important risk factor for suicide in contemporary Sweden: an 11-year follow-up study of a cross-sectional sample of 37 789 people. *Public Health, 111*(1), 41-45.

Johnson, N. D., & Mislin, A. (2012). How much should we trust the World Values Survey trust question? *Economics Letters, 116*(2), 210-212.

Karstedt, S. (2006). Democracy, values, and violence: Paradoxes, tensions, and comparative advantages of liberal inclusion. *The Annals of the American Academy of Political and Social Science, 605*(1), 50-81.

Kelly, B. D., Davoren, M., Mhaoláin, Á. N., Breen, E. G., & Casey, P. (2009). Social capital and suicide in 11 European countries: An ecological analysis. *Social Psychiatry and Psychiatric Epidemiology, 44*(11), 971-977.

Kim, S.-W., & Pridemore, W. A. (2005). Social support and homicide in transitional Russia. *Journal of Criminal Justice, 33*(6), 561-572.

Koeppel, M. D., Rhineberger-Dunn, G. M., & Mack, K. Y. (2013). Cross-national homicide: a review of the current literature. *International Journal of Comparative and Applied Criminal Justice*(ahead-of-print), 1-39.

Kozlowski, S. W., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes.

Krahn, H., Hartnagel, T. F., & Gartrell, J. W. (1986). Income inequality and homicide rates: Cross-national data and criminological theories. *Criminology, 24*(2), 269-294.

Lafree, G., & Tseloni, A. (2006). Democracy and crime: A multilevel analysis of homicide trends in forty-four countries, 1950-2000. *Annals of the American Academy of Political and Social Science, 605*(1), 25-49.

Langbein, L., & Knack, S. (2009). The Worldwide Governance Indicators: Six, one, or none? *The Journal of Development Studies, 46*(2), 350-370.

Large, M., Smith, G., Swinson, N., Shaw, J., & Nielssen, O. (2008). Homicide due to mental disorder in England and Wales over 50 years. *The British Journal of Psychiatry, 193*(2), 130-133.

Lederman, D., Loayza, N., & Mendendez, A. M. (2002). Violent crime: Does social capital matter? *Economic Development and Cultural Change, 50*, 509-539.

Lenzi, M., Colucci, E., & Minas, H. (2012). Suicide, culture, and society from a cross-national perspective. *Cross-Cultural Research, 46*(1), 50-71.

Lester, D. (1988). Economic factors and suicide. *Journal of Social Psychology, 128*(2), 245.

Lester, D. (2000). *Why people kill themselves: A 2000 summary of research on suicide*. Springfield, IL: Charles C Thomas Publisher.

Leung, K., Bond, M. H., de Carrasquel, S. R., Munoz, C., Hernandez, M., Murakami, F., . . . Singelis, T. M. (2002). Social Axioms: the search for universal dimensions of general beliefs about how the world functions. *Journal of Cross-Cultural Psychology*(3), 286.

Levitt, S. D. (2004). Understanding why crime fell in the 1990s: Four factors that explain the decline and six that do not. *The Journal of Economic Perspectives, 18*(1), 163-190.

Lim, F., Bond, M. H., & Bond, M. K. (2005). Linking societal and psychological factors to homicide rates across nations. *Journal of Cross-Cultural Psychology, 36*(5), 515-536.

Lin, W.-H., & Mieczkowski, T. (2011). Subjective strains, conditioning factors, and juvenile delinquency: general strain theory in Taiwan. *Asian Journal of Criminology*(1), 69.

Long, J. S., & Freese, J. (2006). *Regression models for categorical dependent variables using Stata*: Stata press.

Loureiro, P. R. A., & Silva, E. C. (2012). What Causes Intentional Homicide? *Journal of International Development, 24*(3), 287-303.

Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impedes cognitive function. *Science, 341*(6149), 976-980.

Marx, K., & Engels, F. (2002). *The communist manifesto*. New York, NY: Penguin.

Matsubayashi, T., & Ueda, M. (2011). The effect of national suicide prevention programs on suicide rates in 21 OECD nations. *Social Science and Medicine, 73*(9), 1395-1400.

Maume, M. O., & Lee, M. R. (2003). Social institutions and violence: A sub-national test of institutional anomie theory. *Criminology, 41*(4), 1137-1172.

McCall, P. L., & Nieuwbeerta, P. (2007). Structural covariates of homicide rates: A European city cross-national comparative analysis. *Homicide Studies, 11*, 167-188.

McClendon, M. J. (2002). *Multiple regression and causal analysis*. Long Grove, IL: Waveland Press.

Mehta, P. D., & Neale, M. C. (2005). People are variables too: multilevel structural equations modeling. *Psychological Methods, 10*(3), 259.

Messner, S. F., Raffalovich, L. E., & Shrock, P. (2002). Reassessing the cross-national relationship between income inequality and homicide rates: implications of data quality control in the measurement of income distribution. *Journal of Quantitative Criminology, 18*(4), 377-395.

Messner, S. F., Raffalovich, L. E., & Sutton, G. M. (2010). Poverty, infant mortality, and homicide rates in cross-national perspective: Assessments of criterion and construct validity. *Criminology, 48*(2), 509-537.

Messner, S. F., & Rosenfeld, R. (1994). *Crime and the American Dream*. Belmont, CA: Thomson/Wadsworth.

Messner, S. F., & Rosenfeld, R. (1997). Political restraint of the market and levels of criminal homicide: A cross-national application of institutional anomie theory. *Social Forces, 75*(4), 1393-1416.

Meuleman, B., & Billiet, J. (2009). *A Monte Carlo sample size study: How many countries are needed for accurate multilevel SEM?* Paper presented at the Survey Research Methods.

Mikucka, M., & Sarracino, F. (2014). Making economic growth and well-being compatible: the role of trust and income inequality.

Morselli, H. ([1879]1882). *Suicide: An Essay in Comparative Moral Statistics* (Abridged Edition ed.). New York: Appleton.

Neapolitan, J. L. (1997). Homicides in developing nations: Results of research using a large and representative sample. *International Journal of Offender Therapy and Comparative Criminology, 41*(4), 358-374.

Neapolitan, J. L. (1998). Cross-national variation in homicides: is race a factor? *Criminology, 36*(1), 139-156.

Neapolitan, J. L. (2001). An examination of cross-national variation in punitiveness. *International Journal of Offender Therapy and Comparative Criminology, 45*(6), 691-710.

Nemes, S., Jonasson, J., Genell, A., & Steineck, G. (2009). Bias in odds ratios by logistic regression modelling and sample size. *BMC Medical Research Methodology, 9*(1), 56.

Neumayer, E. (2003). Good policy can lower violent crime: Evidence form a cross-national panel of homicide rates 1980-97. *Journal of Peace Research, 40*(6), 619-640.

Neumayer, E. (2004). Recessions lower (some) mortality rates: Evidence from Germany. *Social Science and Medicine, 58*(6), 1037-1047.

Newton, K. (2001). Trust, social capital, civil society, and democracy. *International Political Science Review, 22*(2), 201-214.

Nivette, A. E. (2011). Cross-national predictors of crime: A meta-analysis. *Homicide Studies, 15*(2), 103-131.

Nock, M. K., Borges, G., Bromet, E. J., Alonso, J., Angermeyer, M., Beautrais, A., . . . Williams, D. (2008). Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. *The British Journal of Psychiatry, 192*(2), 98-105.

Noh, Y.-H. (2009). Does unemployment increase suicide rates? The OECD panel evidence. *Journal of Economic Psychology, 30*(4), 575-582.

Okada, K., & Samreth, S. (2013). A study on the socio-economic determinants of suicide: Evidence from 13 European OECD countries. *The Journal of Socio-Economics, 45*(0), 78-85.

Okamoto, M., Kawakami, N., Kido, Y., & Sakurai, K. (2013). Social capital and suicide: An ecological study in Tokyo, Japan. *Environmental Health and Preventive Medicine, 18*(4), 306-312.

Ouimet, M. (2012). A World of Homicides: The Effect of Economic Development, Income Inequality, and Excess Infant Mortality on the Homicide Rate for 165 Countries in 2010. *Homicide Studies, 16*(3), 238-258. doi: 10.1177/1088767912442500

Palmer, S. (1965). Murder and suicide in forty non-literate societies. *The Journal of Criminal Law, Criminology, and Police Science, 56*(3), 320-324.

Palmer, S. (1972). *The violent society*. New York, NY: Rowman & Littlefield.

Pampel, F. C., & Gartner, R. (1995). Age structure, socio-political Institutions, and national homicide rates. *European Sociological Review, 11*(3), 243-260.

Pare, P.-P., & Felson, R. (2014). Income inequality, poverty and crime across nations. *The British Journal of Sociology, 65*(3), 434-458.

Phillips, J. (2013). Factors associated with temporal and spatial patterns in suicide rates across u.s. states, 1976-2000. *Demography, 50*(2), 591-614.

Pierard, E., & Grootendorst, P. (2014). Do downturns cause desperation? the effect of economic conditions on suicide rates in Canada. *Applied Economics, 46*(10-12), 1081-1092.

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Pratt, T. C., & Cullen, F. T. (2005). Assessing macro-level predictors and theories of crime: A meta-analysis. *Crime and Justice, 32*, 373-450.

Pratt, T. C., & Godsey, T. W. (2002). Social support and homicide: a cross-national test of an emerging criminological theory. *Journal of Criminal Justice, 30*, 589-601.

Pratt, T. C., & Godsey, T. W. (2003). Social support, inequality, and homicide: a cross-national test of an integrated theoretical model. *Criminology, 41*(3), 611-643.

Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods, 15*(3), 209.

Pridemore, W. A. (2008). A methodological addition to the cross-national empirical literature on social structure and homicide: a first test of the poverty-homicide thesis*. *Criminology, 46*(1), 133-154.

Pridemore, W. A. (2011). Poverty matters: A reassessment of the inequality-homicide relationship in cross-national studies. *British Journal of Criminology, 51*(5), 739-772.

Pridemore, W. A., & Trent, C. L. S. (2010). Do the invariant findings of Land, McCall, and Cohen generalize to cross-national studies of social structure and homicide? *Homicide Studies, 14*(3), 296-335.

Pridmore, S., & Pasha, M. I. (2004). Religion and spirituality: psychiatry and Islam. *Australasian Psychiatry, 12*(4), 381-385.

Rezaeian, M. (2008). Islam and suicide: A short personal communication. *OMEGA--Journal of Death and Dying, 58*(1), 77-85.

Rogers, M. L., & Pridemore, W. A. (2013). The effect of poverty and social protection on national homicide rates: Direct and moderating effects. *Social Science Research, 42*(3), 584-595.

Savolainen, J. (2000). Inequality, welfare state, and homicide: Further support for the institutional anomie theory. *Criminology, 38*(4), 1021-1042.

Scientific Software International. (2015). Centering. from http://www.ssicentral.com/hlm/techdocs/Centering.pdf

Shah, A. (2011). Elderly suicide rates: a replication of cross-national comparisons and association with sex and elderly age-bands using five year suicide data. *Journal Of Injury & Violence Research, 3*(2), 80-84.

Shah, A. (2012). Suicide rates: age-associated trends and their correlates. *Journal Of Injury & Violence Research, 4*(2), 79-86.

Shah, A., & Bhandarkar, R. (2011). Does adversity early in life affect general population suicide rates? A cross-national study. *Journal Of Injury & Violence Research, 3*(1), 25-27.

Simpson, M. E., & Conklin, G. H. (1989). Socioeconomic development, suicide and religion: A test of Durkheim's theory of religion and suicide. *Social Forces, 67*(4), 945-964.

Sisask, M., Värnik, A., Klves, K., Bertolote, J. M., Bolhari, J., Botega, N. J., . . . Wasserman, D. (2010). Is Religiosity a Protective Factor Against Attempted Suicide: A Cross-Cultural Case-Control Study. *Archives of Suicide Research, 14*(1), 44-55.

Stack, S. (1982). Suicide: A decade review of the sociological literature. *Deviant Behavior, 4*(1), 41-66.

Stack, S. (2000). Suicide: a 15-year review of the sociological literature part I: cultural and economic factors. *Suicide and Life-Threatening Behavior, 30*(2), 145-162.

Stack, S., & Kposowa, A. J. (2011). Religion and Suicide Acceptability: A Cross-National Analysis. *Journal for the Scientific Study of Religion, 50*(2), 289-306.

Stack, S., & Wasserman, I. (2007). Economic strain and suicide risk: A qualitative analysis. *Suicide and Life-Threatening Behavior, 37*(1), 103-112.

Stack, S., & Wasserman, I. R. A. (2009). Gender and Suicide Risk: The Role of Wound Site. *Suicide & Life-Threatening Behavior, 39*(1), 13-20.

Stark, R. (1984). Religion and conformity: Reaffirming a sociology of religion. *SA. Sociological Analysis*, 273-282.

Stata. (2015a). Exact logistic regression. Retrieved February 23, 2015, from http://www.stata.com/features/overview/exact-logistic-regression/

Stata. (2015b). Multiple imputation.   Retrieved February 10, 2015, from
http://www.stata.com/features/multiple-imputation/

Stata. (2015c). Robust regression.   Retrieved February 23, 2015, from
http://www.stata.com/manuals13/rrreg.pdf

Sun, I. Y., Chu, D., & Sung, H. (2011). A Cross-National Analysis of the Mediating Effect of
Economic Deprivation on Crime. *Asian Journal of Criminology, 6*(1), 15-32.

United Nations. (2014a).   Retrieved June 20, 2014, from www.childmortality.org

United Nations. (2014b).   Retrieved June 10, 2014, from www.un.org/en/aboutun/index.shtml

United Nations Development Programme. (2011). Human Development Report 2011.
Sustainability and equity: A better future for all: UNDP.

United Nations Development Programme. (2012).   Retrieved December 5, 2014, from
http://hdrstats.undp.org

United Nations Development Programme. (2014).   Retrieved June 15, 2014, from
www.undp.org

United Nations Office on Drugs and Crime. (2012). 2011 Global study on homicide. Vienna:
The United Nations.

United Nations Office on Drugs and Crime. (2014a).   Retrieved June 15, 2014, from
www.unodc.org/unodc/en/about-unodc/index.html?ref=menustop

United Nations Office on Drugs and Crime. (2014b). 2013 Global study on homicide. Vienna:
The United Nations.

United States Census Bureau. (2013).   Retrieved February 3, 2014, from
http://www.census.gov/hhes/www/poverty/about/overview/index.html

University of Leeds. (2015). Stepwise linear regression.   Retrieved March 12, 2015, from
http://www.geog.leeds.ac.uk/courses/other/statistics/spss/stepwise/

Unnithan, N. P., Huff-Corzine, L., Corzine, J., & Whitt, H. P. (1994). *The currents of lethal violence: An integrated model of suicide and homicide*: SUNY Press.

Wang, L., & Gordon, P. (2011). Trust and institutions: A multilevel analysis. *The Journal of Socio-Economics, 40*(5), 583-593.

Wasserman, D., Cheng, Q., & Jiang, G.-X. (2005). Global suicide rates among young people aged 15-19. *World Psychiatry: Official Journal Of The World Psychiatric Association (WPA), 4*(2), 114-120.

Weaver, G. S., Martin, C. D., & Petee, T. A. (2004). Culture, context, and homicide of the elderly. *Sociological inquiry, 74*(1), 2-19.

Whitt, H. P. (1994). Old Theories Never Die *The Currents of Lethal Violence, An Integrated Model of Suicide and Homicide* (pp. 7-35). Albany: State University of New York Press.

Whitt, H. P., Gordon, C. C., & Hofley, J. R. (1972). Religion, economic development and lethal aggression. *American Sociological Review*, 193-201.

World Bank. (2013).   Retrieved October 22, 2013, from http://www.worldbank.org/en/about/history

World Bank. (2014). World Governance Indicators.   Retrieved May 5, 2014, from http://info.worldbank.org/governance/wgi/

World Health Organization. (2012).   Retrieved December 5, 2012, from http://www.who.it

World Health Organization. (2014). Preventing suicide: a global imperative.

World Health Organization. (2015a). Japan turning a corner in suicide prevention.   Retrieved March 10, 2015, from http://www.who.int/mental_health/suicide-prevention/japan_story/en/

World Health Organization. (2015b). Suicide.   Retrieved January 10, 2015, from http://www.who.int/topics/suicide/en/

World Health Organization. (2015c). Suicide. Retrieved February 5, 2015, from http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/

World Health Organization. (2015d). WHO Mortality Database. Retrieved January 25, 2015, from http://www.who.int/healthinfo/mortality_data/en/

World Health Organization. (2015e). Women and suicide in rural China. *Bulletin of the World Health Organization.* Retrieved January 10, 2015, from http://www.who.int/bulletin/volumes/87/12/09-011209/en/

World Values Survey. (2013). Retrieved November 10, 2013, from http://www.worldvaluessurvey.org/WVSContents.jsp

World Values Survey. (2015). Retrieved February 28, 2015, from http://www.worldvaluessurvey.org/WVSContents.jsp?CMSID=FieldworkSampling

Worrall, J. L. (2009). Social support and homicide. *Homicide Studies, 13*(2), 124-143.

Yang, B., & Lester, D. (1988). The participation of females in the labor force and rates of personal violence (suicide and homicide). *Suicide and Life-Threatening Behavior, 18*(3), 270-278.

Yang, B., & Lester, D. (1992). Suicide, homicide and unemployment: a methodological note. *Psychological reports, 71*(3 Pt 1), 844-846.

Yi-Sheng, J., & Ming-Chang, T. (2013). The Correlation between Socioeconomic Factors and the Suicide Rate. *International Journal of Intelligent Technologies & Applied Statistics, 6*(4), 415-429.

Yodanis, C. L. (2004). Gender inequality, violence against women, and fear: A cross-national test of the feminist theory of violence against women. *Journal of Interpersonal Violence, 19*(6), 655-675.

Young, W., & Brown, M. (1993). Cross-national comparisons of imprisonment. *Crime and Justice*, 1-49.

Zhang, J. (2005). Conceptualizing a strain theory of suicide (review). *Chinese Mental Health Journal, 19*(11), 774.

Zhang, J., Dong, N., Delprino, R., & Zhou, L. (2009). Psychological strains found from in-depth interviews with 105 Chinese rural youth suicides. *Archives of Suicide Research, 13*(2), 185-194.

Zhang, J., & Lester, D. (2008). Psychological tensions found in suicide notes: A test for the strain theory of suicide. *Archives of Suicide Research, 12*(1), 67-73.

Zhang, J., & Song, Z. (2006). A preliminary test of the strain theory of suicide. *Chinese Journal of Behavioral Medical Science, 15*(6), 487-489.

Zhang, J., Wieczorek, W. F., Conwell, Y., & Tu, X. M. (2011). Psychological strains and youth suicide in rural China. *Social Science and Medicine, 72*(12), 2003-2010.