ABSTRACT

TUTTLE, JAMES ARTHUR. Culture, Attributional Style, and Lethal Violence: A Cross-National Test of the 'Stream Analogy' of Violence. (Under the direction of Dr. Patricia L. McCall.)

In the most recent theoretical iteration of the 'stream analogy' of lethal violence, Unnithan et al. (1994) hypothesize that homicide and suicide are the product of a single source of lethal violence that "flows" through a society. According to the authors, this undifferentiated stream of lethal violence is directed toward either suicide or homicide by social structure and cultural values influencing individual attributional style. The current research offers an elaboration on a general cultural dimension that is hypothesized to influence the 'direction' of lethal violence within society, linking the independent conceptualization of self and the self-serving attributional bias more readily apparent in Western nations to external attributions of blame, which direct lethal violence toward homicide. Although the measure of the independent conceptualization of self ("individualism") is not one of the strongest predictors of the direction of violence in this sample of 31 OECD nations, the findings from the multilevel regression model used in this analysis advances the literature on this topic in several ways. As the only longitudinal cross-national multilevel analysis found in the stream analogy literature to date, the research is able to parse out the between- and within-country effects on the production and direction of lethal violence not explicated in traditional cross-sectional analyses. The results of this study give partial support to Unnithan and colleague's (1994) theory, but suggest that social support (Cullen 1994) and social integration (Henry and Short 1954) need to be integrated into the theoretical framework of the stream analogy.

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Culture, Attributional Style, and Lethal Violence: A Cross-National Test of the 'Stream Analogy' of Violence

by
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DEDICATION

To my long-suffering wife, Jen, who has sacrificed greatly on my behalf.

BIOGRAPHY

James Tuttle spent his childhood in rural southeast Nebraska, living mostly in or near the village of Lewiston. James attended McPherson College to complete his baccalaureate degree and graduated in 2011 with a double-major in Sociology and Psychology. He is currently a Ph.D. student at North Carolina State University in the department of Sociology and Anthropology. His research interests include suicide, violent crime, social determinants of mental illness and sociological theory.

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INTRODUCTION

Suicide is one of the leading causes of death worldwide; nearly one million people die each year as the result of self-inflicted injuries. The number of reported suicides has increased by 60% in the last 45 years, indicating that self-inflicted harm is a growing international problem (World Health Organization 2013a). However, despite the alarming increase of suicide rates worldwide, research published in major sociology journals on the subject of suicide has waned in the last few decades (Wray, Colen and Pescosolido 2011). In order to address the growing international problem of suicide from a sociological perspective, this research proposes an elaboration and cross-national test of one of the more recent sociological theories on suicide proposed by Unnithan, Huff-Corzine, Corzine and Whitt (1994) in *The Currents of Lethal Violence*.[1]

In *The Currents of Lethal Violence*, Unnithan et al. (1994) provide an updated theoretical model of the 'stream analogy' of lethal violence (see 'Figure 1' in for a visual representation of the stream analogy). The stream analogy posits that lethal violence "flows" through a society like an undifferentiated stream and is directed toward either homicide or suicide by structural and cultural factors. Unnithan et al. hypothesize that economic stressors and structural factors causing 'systemic frustration' are the main producers of lethal violence within a society, referred to as the "forces of production." After aggression caused by frustration is "produced," it is then directed toward either homicide or suicide based on how

[1] Unnithan et al (1994) attempt to explain both suicide and homicide in their 'integrated' theory of lethal violence. Excluding deaths caused by war, an estimated 468,000 homicides were reported in 2010 (UNODC 2011). Combining the occurrence of homicide and suicide, nearly one and a half million individuals die each year due to the intentional violent actions of themselves or others.

individuals attribute blame for their frustration and hardship. The authors hypothesize that cultural factors, structural inequality and economic development affect the attributional style of individuals within society, referred to as the "forces of direction," directing violence toward either homicide or suicide.[2]

In the nearly 20 years since Unnithan et al. (1994) put forth an updated version of the 'stream analogy' of lethal violence in *The Currents of Lethal Violence*, few have conducted cross-national tests of the theory (Chon 2013; He et al. 2003). During this time period, no cross-national research could be located specifically examining the effects of cultural values on the direction of lethal violence within society. This research attempts to address this short-coming in the current literature. Specifically, this study examines whether individuals living in countries with an independent conceptualization of self are more prone to externalize blame than individuals living in cultures with an interdependent conceptualization of self, resulting in proportionally more homicides as a proportion of lethal violence (Markus and Kitayama 1991). This research will contribute to the literature by using multilevel regression modeling to capture both within-country over time and between-country effects on the production and direction of lethal violence. Also, this research examines whether measures of social support and social integration need to be integrated into Unnithan and colleagues' (1994) stream analogy framework. Findings should suggest possible avenues for future theoretical improvements and integration with other major theoretical perspectives explaining lethal violence. Finally, the impact of religion on the direction of violence within

[2] As depicted in 'Figure 1,' the forces of production produce violence within a society, which is measured by the total lethal violence rate (LVR) while the forces of direction direct lethal violence toward homicide or suicide, indicated by the suicide-homicide ratio (SHR).

society is investigated in this research, which is the first time since 1972 (Whitt, Gordon and Hofley 1972) that religion has been examined in research testing the stream analogy of lethal violence.

Before discussing Unnithan and colleagues' (1994) theoretical framework, previous work on the stream analogy is presented. Specifically, Henry and Short's (1954) *Suicide and Homicide* is included in this literature review as Unnithan et al. (1994) use Henry and Short's theory as a starting point for their theoretical formulation of an integrated model of suicide and homicide. After a discussion of Unnithan and collegues' (1994) *The Currents of Lethal Violence*, there is a brief literature review of research since 1994 testing their theoretical framework and a discussion of the strengths and weaknesses of this theory. Finally, an elaboration on the model is presented, specifically linking cultural conceptualization of self (Markus and Kitayama 1991) to attributional style and the direction of lethal violence within a society.

THE 'STREAM ANALOGY' OF LETHAL VIOLENCE

In Émile Durkheim's (1966 [1897]) foundational text, *Suicide*, he conceptualizes suicide and homicide as separate social phenomena. Durkheim hypothesizes: "If suicide and homicide often vary inversely to one another, it is not because they are two different aspects of the same phenomenon; but because in some respects they form two opposed social currents" (Durkheim (1966 [1897]: 358). He goes on to write that in some cases, certain 'types' of suicide (i.e. Egoistic, Anomic, Altruistic, and Fatalistic) may be linked to

homicide, but the two acts are largely analytically distinct. The strength of Durkheim's (1966 [1897]) argumentation influenced sociological work on suicide and homicide for much of the 20th century, as most scholars study the two acts of lethal violence separately (Whitt 1994a, 1994b).

However, Durkheim's (1966[1897]) treatise on suicide served as the basis for the earliest formal sociological theory on the 'stream analogy' of violence, Henry and Short's (1954) *Suicide and Homicide*. Henry and Short utilize Durkheim's observations concerning the effects of social integration and regulation on suicide to formulate a theory that integrates suicide and homicide into a single causal framework. Much like Durkheim, Henry and Short view social integration and regulation as major factors influencing the number of suicides within a society. In both theories, insufficient social integration and regulation are implicated as causing some individuals to commit suicide.[3] However, unlike Durkheim, Henry and Short view excessive social regulation as potentially leading to homicide when coupled with frustration.

Suicide and Homicide

Essentially, Henry and Short (1954) view the causes of suicide and homicide as a two-stage process. At the first stage, the individual is frustrated by economic conditions and this frustration turns into aggression (and lethal violence). At the second stage, lethal violence is either directed toward suicide as the result of insufficient social restraint or lethal violence is directed toward homicide as the result of excessive social restraint. Suicide occurs when the individual experiences frustration and has no legitimate target to blame for this

[3] Henry and Short (1954) refer to social regulation as "external restraint" or social restraint.

frustration and is not sufficiently integrated into the "relational system." Homicide occurs when the individual experiences frustration and is able to legitimate using violence against others as s/he is socially restrained and perceives others as blameworthy for stress and frustration.[4]

Although Henry and Short (1954) utilize Durkheim's (1966 [1897]) insights concerning social integration and regulation, they hypothesize that these social forces only influence the *direction* of lethal violence. According to Henry and Short, all lethal violence is the result of aggression, which is caused by frustration. The authors utilize three basic assumptions to explain the amount of lethal violence within a society: "(1) aggression is often a consequence of frustration; (2) business cycles produce variation in the hierarchical ranking of persons and groups; and (3) frustrations are generated by the interference with the "goal response" of maintaining a constant or rising position in a status hierarchy relative to the status position of others in the same status reference system" (Henry and Short 1954: 14). Using these assumptions as a basic premise for their theory, the authors hypothesize that all lethal violence is caused by aggression brought about by relative frustration, often stemming from fluctuations in the economy.

This undifferentiated source of aggression is then directed toward either homicide or suicide depending largely upon an individual's level of external restraint. The authors hypothesize that an individual in a higher position within the social hierarchy is less

[4] Henry and Short's (1954) theoretical model also includes a more dynamic account of how economic recessions may cause certain subordinate groups to actually feel less frustration as they experience a relative rise in the social hierarchy in relation to superordinate groups (who are more affected by economic recessions). However, I am only focusing on the main argument of their theory as no subsequent research can be located empirically testing the 'dynamic' portion of the theory.

externally restrained by others and therefore directs aggression toward him/herself in the form of suicide as there is no apparent target to blame for their frustrations. If the individual is in a lower status position within the social hierarchy, s/he is more externally restrained and therefore views other people as blameworthy for his/her frustration. Strong external restraint causes individuals to direct aggression toward others in the form of homicide. Also, following Durkheim (1966 [1897]), the authors hypothesize that individuals who are more socially controlled through their integration into the "relational system" are less prone to suicide. But, if individuals experience social control through the relational system, they may be more prone to homicide as they feel more external restraint from others and blame others for their frustrations. Henry and Short also hypothesize that psychological correlates, such as the development of a strong super-ego and excessive reactivity to stress encourage individuals to direct lethal violence toward suicide rather than homicide. Strict and punitive demands by an individual's parents are internalized into the individual's psyche and prevent the individual from aggressing toward others, directing all frustration/aggression inward (Henry and Short 1954).

Critiques and Tests of Henry and Short (1954)

Gold (1958) provided one of the first empirical tests and critiques of Henry and Short's (1954) theoretical framework. Gold demonstrates that the original formulation of the theory needs further specification. First, Gold questions whether people of higher status are unambiguously under less social restraint as some higher status groups (in Gold's example, military officers) may have more constraints on their behavior than lower status groups

because social norms apply more strictly to certain higher-status groups. Second, Gold more clearly links child-rearing practices to homicide and suicide, avoiding some of the questionable assumptions about super-ego formation by examining how middle class parents and lower/working class parents socialize their children. By using direct physical punishment, lower/working class parents provide their children an observable/apparent target to blame for the punishment or pain they feel. Middle class parents are more likely to use subtle forms of punishment, such as psychological punishment(s) – giving the child no observable target to attribute their frustration, sometimes causing them to internalize blame for their frustrations. Based on this hypothesis, Gold believes it is not position within the social hierarchy, but rather middle class parenting style that affects attribution of blame.

The most influential contribution made by Gold (1958) to research on the 'steam analogy' is the methodological innovation of accounting for total violence (adding murder and suicide rates together) and then calculating the *proportion* of total violence that is expressed as suicide. Theoretically, Gold claims that certain groups may have higher rates of frustration or may be more likely to commit lethal acts of violence than other groups. Therefore, if suicide and homicide are related phenomena, researchers must calculate the relative amount of violence a group expresses as suicide in order to determine whether those group members are proportionally more prone to suicide or homicide than other groups. Gold expresses this through the 'Suicide-Murder Ratio' (SMR) which is calculated as:

SMR = Suicide rate/(Suicide rate + Homicide rate).

With this formulation, Gold (1958) corrects Henry and Short's (1954) logical mistake of attempting to make a meaningful comparison of suicide rates and homicide rates isolated from each other while theorizing that both expressions of lethal violence originate from an undifferentiated source. Subsequent research on the relationship between homicide and suicide rates (or the stream analogy) utilizes this methodological innovation by Gold (1958) which is commonly referred to as the 'suicide-homicide ratio' or 'SHR' (Whitt 1994b).[5]

Between Gold's (1958) methodological innovation and Unnithan and collegues' (1994) theoretical elaboration and extension of Henry and Short's (1954) theory, other critiques and tests of the stream analogy of violence were conducted (Hackney 1969; Huff-Corzine, Corzine and Moore 1991; Quinney 1965; Unnithan and Whitt 1992; Whitt et al. 1972). One line of research (Hackney 1969; Huff-Corzine, Corzine and Moore 1991) has investigated higher rates of homicide in the southern region of the United States using Gold's (1958) SHR formulation. Hackney (1969) found that southern U.S. states have proportionally more violence expressed as homicide and proportionally less violence expressed as suicide than other regions. Hackney argues that the social and historical forces particular to the South have caused southerners to blame outsiders for their problems, turning lethal violence against others. Huff-Corzine et al. (1991) confirmed Hackney's research by demonstrating that individuals living in the South tend to express violence as homicide rather than suicide. The authors also find that poverty is associated with higher rates of overall violence – but its

[5] Gold (1958) refers to the relative ratio of suicides to all lethal violence within a society as the 'SMR' to avoid confusion with Clark Hull's use of the acronym 'SHR.' However, most authors after Gold refer to the relative ratio of suicides to total lethal violence as the 'SHR.' Although the suicide-homicide ratio is a bit a misnomer as the measure is more accurately referred to the suicide to total lethal violence ratio, outside of the discussion of Gold's original research I will use the acronym SHR to refer to the ratio of suicides to total lethal violence.

expression depends on race. Southern Whites living in poverty tend to direct violence toward themselves more than Blacks.

Another line of research has focused on cross-national variation in the suicide and homicide. Quinney (1965) tested the relationship between economic development and homicide and suicide rates in a bivariate cross-national analysis of 48 countries. Overall, Quinney found that as a nation becomes more economically developed, suicide rates increase and homicide rates decrease. Quinney claimed that because suicide and homicide rates vary in opposite directions and have seemingly disparate causes, the two acts should thus be viewed as conceptually and analytically distinct social phenomena. Whitt et al. (1972) attempted to address Quinney's (1965) critique by claiming that the effects of industrialization on suicide and homicide rates are contingent upon the predominant religion of a given society. The authors hypothesized that because economic development is congruent with the 'Protestant Ethic,' economically developed Protestant Christian nations would have less total violence than Catholic and non-Christian nations. The authors also found that economically developed Protestant Christian nations tend to express violence as suicide (a higher SHR) than individuals living in economically developed Catholic and non-Christian nations because Protestants are more prone to blame themselves for frustrations and failures than Catholics and non-Christians (see Whitt 1994c: 93-94).

A precursor to the full theoretical model explicated in *The Currents of Lethal Violence* is Unnithan and Whitt's (1992) study focusing on the role of economic inequality and economic development in both producing and directing lethal violence toward suicide

and homicide. On the one hand, the authors found a curvilinear relationship between the level of economic development and the direction of lethal violence, with greater levels of economic development within a society predicting higher rates of suicide in proportion to homicide. On the other hand, societies with a greater level economic inequality tend to direct lethal violence toward homicide. Although economic development is not associated with the production of lethal violence, the authors found that economic inequality has a curvilinear relationship with the production of lethal violence. These empirical tests and critiques of the stream analogy culminated in Unnithan and colleagues' (1994) *The Currents of Lethal Violence*, which explicates an updated version of the stream analogy of lethal violence.

The Currents of Lethal Violence

In *The Currents of Lethal Violence*, Unnithan et al. (1994) provide a theoretical update and elaboration of Henry and Short's (1954) theory put forth in *Suicide and Homicide*. Like Henry and Short, Unnithan et al. conceptualize lethal violence as 'flowing' through a society like an undifferentiated 'stream.' Unnithan et al. hypothesize that this stream of lethal violence is created by socially patterned "forces of production" that cause stress and frustration. Although the forces that produce lethal violence are not fully explicated within the theoretical model, it appears that economic stressors and "systemic frustration" (closely related to Robert Merton's (1938) conception of "anomie") are conceptualized as the main producers of violence within a society.[6] The authors stress that

[6] Merton's (1938) conceptualization of 'anomie' is distinct from Durkheim's (1966[1897]) use of the word in *Suicide*. Merton is referring to the relative gap between socially the appropriate 'goals' and 'means' to achieve these goals while Durkheim uses the word to denote the breakdown of societal norms during times of social change (or normlessness).

"socially patterned sources of frustration, stress, and negative life events" produce lethal violence within a society (Whitt 1994d: 96). The total amount of lethal violence produced within a society is referred to as the Lethal Violence Rate (LVR). According to Whitt (1994d: 96): "The total volume of "water" in the stream is represented in the integrated model by the lethal violence rate, or LVR, defined as the sum of the suicide rate and homicide rate."

The authors hypothesize that violence caused by economic stressors and systemic frustration is then directed toward either homicide or suicide by the aggregate of individual attributional style in a society or region. On the one hand, if individuals believe others are at fault for their stress and frustration, they will take their frustration out on others in the form of homicide. On the other hand, if individuals blame themselves for stresses and frustrations, they will commit suicide rather than homicide. Although the mechanism directing lethal violence toward either homicide or suicide in Unnithan and colleagues' (1994) theory is largely the same as Henry and Short's (1954) 'attribution of blame,' Unnithan et al. connect contemporary psychological research to macro social influences affecting the aggregate of individual attributional style. However, Unnithan et al. largely disregard social regulation and integration as forces influencing the direction of violence.

Unnithan et al. (1994) utilize psychological research on the 'stress-diathesis' model of anxiety and depression as the underlying psychological mechanism influencing whether lethal violence is expressed as either homicide or suicide. Unnithan et al. (1994) propose that the SHR (suicides as a proportion of total violence) is "…a product of situational and cultural

factors that contribute to the development of explanatory styles which include causal explanations of bad events (frustrations) that are (1) internal, (2) stable, and (3) global" (Whitt 1994d: 97). When negative life experiences are interpreted as internal, stable, and affecting all aspects of life, individuals will blame themselves for frustrations and, at the same time, see themselves to be helpless to control negative events, perceiving their future to be hopeless. This type of interpretation of negative life events causes individuals who experience stress and frustration to express violence as suicide. The authors theorize that as humans gain more control over the environment through economic development, they are more likely to see themselves as masters of their own fate, but still view themselves. This causes individuals within economically advanced societies to internalize blame and hence direct lethal violence toward suicide. Also, certain cultures socialize individuals to internalize blame which causes proportionally more suicides than homicides when compared with societies that foster outward attributions of blame (see Whitt 1994c).

However, if individuals attribute the cause of frustration as due to external forces, they will express lethal violence as homicide. A high level of (economic) inequality is hypothesized to cause individuals to externalize blame as inequality fosters a sense of unfairness and alienation and a feeling that external forces are responsible for failures and frustrations (Blau and Blau 1982). The authors also hypothesize that racial and ethnic heterogeneity within a population will direct violence outward toward homicide. Finally, cultural values fostering an external attributional style direct violence toward homicide. Research on specific 'subcultures' demonstrates that the historical and social background of a

population can foster external attributions of blame and cause proportionally more homicides as the total amount of violence (a lower SHR) (Hackney 1969; Huff-Corzine et al. 1991; Whitt 2010).

Two tests of the theory are offered by Unnithan et al. (1994) in *The Currents of Lethal Violence*. One test of the theory examines the 'stream analogy' cross-nationally (Unnithan, Huff-Corzine and Whitt 1994) and the other examines the theory in the United States (Corzine and Huff-Corzine 1994). In a cross-national sample of 88 nations, economic inequality is positively associated with lethal violence (a non-linear relationship) and directs lethal violence toward homicide (a lower SHR) while economic development directs violence toward suicide (a higher SHR) (Unnithan, Huff-Corzine and Whitt 1994), confirming the general tenets of the theory. Similarly, Corzine and Huff-Corzine (1994) found that poverty is associated with greater levels of lethal violence among Whites living in the southern region of the United States. The authors also found some indication that individuals living in the South are more prone to homicide than suicide (as compared with the rest of the United States), which supports the notion that there are cultural and historical factors (Cash 1941; Hackney 1969) that condition individuals toward external rather than internal attributions of blame. However, the percent of individuals born in the South ("Southernness") did not predict total lethal violence. These tests of the theoretical framework put forth by Unnithan et al. (1994) provided a starting point for future researchers to investigate the updated version of the stream analogy of lethal violence.

Research since The Currents of Lethal Violence

It has been nearly two decades since *The Currents of Lethal Violence* was published. Since then, few authors have attempted to refine the theory and address some of the overlooked dimensions of directing violence toward homicide or suicide.[7] Recently, Chon (2013) addressed the previously unexamined relationship between age structure of a population and the SHR. An oversight in Unnithan and colleagues' (1994) theoretical statement is the influence of age structure on suicide and homicide rates. Empirical evidence shows that individuals tend to 'age out' of crime (and homicide) (Gottfredson and Hirschi 1990; McCall et al. 2012) while the risk of suicide tends to increase with age (World Health Organization 2013b). Pampel and Williamson (2001) also demonstrate that suicide and homicide rates vary inversely with each other by age in highly developed nations. Unnithan, et al. (1994) made no mention of why these trends occur. In a cross-national study of 124 nations, Chon correctly identifies that a population's age distribution is a factor that affects suicide and homicide rates (and thus the SHR) at the national-level. As countries develop economically, the demography of the population changes as well. In highly developed nations, there are proportionally fewer young adults who are more prone to commit homicide and a greater number of older adults who are more prone to commit suicide. In Chon's sample, the proportion of the population over 65 (and GDP per capita) is positively associated with the SHR. Chon views the relationship between age structure and the SHR as unproblematic for the theoretical framework put forth by Unnithan et al. (1994) as the elderly

[7] Several studies have used the Unnithan et al. (1994) framework for a theoretical understanding of single acts of violence referred to as "murder-suicides." This literature review focuses exclusively on research pertaining to how the stream analogy is utilized to explain the SHR and LVR.

are more likely to experience frustration and embarrassment from deteriorating physical and mental health and then direct this frustration toward themselves in the form of suicide. However, it should be noted that the population distribution is unrelated to the Lethal Violence Rate (LVR) in Chon's (2013) model and he also gives no substantive explanation why youth are more likely to turn violence outward in the form of homicide, as the age-crime curve suggests.

Another issue not investigated in much depth in *The Currents of Lethal Violence* is the role of gender in shaping attributional style. Vollum and Titterington (2001) demonstrated that women tend to blame themselves for negative life events and personal failures at a higher rate than men. Concordantly, the authors found that women tend to express lethal violence as suicide at a higher rate than men – women have a higher SHR. Batton and Ogle (2003) clearly linked the difference in attribution styles to how men and women differ in their explanation of successes and failures. While men are more likely to attribute success to internal traits such as ability, women are more likely to attribute success to less stable factors such as luck or the ease of the task. Women are more likely to see failures as due to personal attributes while men are more likely to attribute failure to transitory conditions.

Whitt (2010) provided the most comprehensive test of Unnithan and colleagues' (1994) integrated model of homicide and suicide. Utilizing data from early 19th century France, Whitt focused on theories and explanations of lethal violence concerning modernization and internal colonization. Whitt demonstrated that the SHR increases with

modernization, which confirms a central argument of Unnithan and colleagues' (1994) theory. Also, as predicted in accordance with the theory on attributional style, groups who have a "culture of honor" tend to have a lower SHR, indicating that lethal violence in these (sub)cultures tends to be expressed outwardly as homicide. The stress Whitt (2010) placed on internal colonization and cultures of honor reducing suicide rates as a proportion of total lethal violence is also a confirmation of Cash's (1941) and Hackney's (1969) contentions concerning lethal violence in the American South.

Although these studies point to potential oversights in the initial theory, cross-national research on the stream analogy has provided some support for the main arguments made by Unnithan et al. (1994) concerning the production of lethal violence. Non-linear measures of income inequality (He et al. 2003; Unnithan and Whitt 1992; Unnithan et al. 1994), divorce, unemployment (He et al. 2003), and a dummy variable for 'Communist' countries (Chon 2013) have been linked to the LVR in cross-national samples. However, research utilizing county-level data within the U.S. does not consistently support the link between divorce or income inequality and total lethal violence (Lanier 2010; Wu 2003). Although Wu's (2003) research confirmed the link between income inequality and the production of lethal violence, Lanier (2010) does not find a statistically significant relationship between either divorce or income inequality and the lethal violence rate.

Cross-national research has also provided support for Unnithan and colleagues' (1994) theoretical link between income inequality and higher rates of homicide as a proportion of total violence (a lower SHR) and the link between economic development and

higher rates of suicide as a proportion of total violence (a higher SHR) (Chon 2013; He et al. 2003). These results correspond with previous findings (Unnithan and Whitt 1992) and provide strong support for the portion of the theory predicting the direction of lethal violence in international samples. However, there have been some inconsistent findings between cross-national tests of the stream analogy and research conducted using U.S. counties as the unit of analysis. Contrary to cross-national research, Lanier (2010) and Wu (2004) found no relationship between income inequality and the SHR. Additionally, Lanier (2010) failed to find a connection between economic affluence and the SHR within U.S. counties. These inconsistent results between county and international samples indicate the possibility that different processes affect the direction of lethal violence at different levels of analyses.

Finally, research that has analyzed the production of violence (LVR) and the direction of violence (SHR) within U.S. counties has included racial segregation and heterogeneity (Lanier 2010; Wu 2003, 2004) while cross-national studies on the stream analogy have not considered race or ethnicity in their research (Chon 2013; He et al. 2003; Unnithan and Whitt 1992; Unnithan et al. 1994). In U.S. samples, racial segregation and heterogeneity appear to have a significant impact on both the production and direction of violence. At this point, it is unclear whether racial segregation and heterogeneity are pertinent factors in the production and the direction of violence outside of the U.S., although Unnithan et al. (1994) recommended that researchers should study the effect of racial heterogeneity on lethal violence in the closing portion of *The Currents of Lethal Violence*.

Critique of 'The Currents of Lethal Violence'

Although a few empirical issues remain in the stream analogy literature, Unnithan et al. (1994) provide a potentially fruitful direction for research, theoretical elaboration and theoretical integration concerning suicide and homicide. First, they provide a more extensive focus on the relationship between culture and suicide than traditional Durkheimian perspectives. This focus provides future researchers and theorists with a rationale to integrate the effects of culture into the prediction of suicide. Second, the authors integrate research from psychology into the study of suicide. Wray et al. (2011) suggest that sociologists studying suicide should incorporate research from other disciplines into their work or become irrelevant – a task embraced by Unnithan et al. (1994). Finally, these authors add another dimension to traditional strain theory (Merton 1938) by demonstrating that social strain can result in either homicide or suicide depending upon social-psychological, structural and cultural influences.

Although the theory includes a broad, cross-national explanation of the proportion of suicides and homicides as total violence within a country, this theory is not designed to explain individual acts of suicide or homicide or even suicide and homicide rates – instead the theory is intended to explain the production of lethal violence and the direction of lethal violence in a social group or society (Unnithan et al. 1994). Overall, the theory is somewhat narrow in scope as the authors fail to consider non-lethal acts of aggression within their theory, which are undoubtedly related to completed acts of homicide and suicide.[8]

[8] Gottfredson and Hirschi (1990) posit that there is very little the difference between assault and murder in terms of the intention of the assailant. Instead, murder often depends on factors such as proximity to the

Also, despite conceptualizing their work as a critique and update of Henry and Short's (1954) original theory on the stream analogy of violence, Unnithan et al. (1994) stray from the Durkheimian (1966 [1897]) intellectual tradition. Unnithan et al. largely ignore Henry and Short's theoretical contributions concerning social integration and regulation when explicating the causal model in their theory. The role of social integration and regulation has been extensively tested and empirically confirmed within the sociology literature concerning suicide (for instance, see Stack 2000; Wray et al. 2011). Also, influential theories on crime have linked criminal behavior with the lack of positive social bonds (Hirschi 1969) that deter individuals from committing crime, including homicide. Yet pro-social influences restraining individuals from homicide and suicide are not given sufficient attention by Unnithan et al. The authors simply address social strains that may compel individuals within a society to kill themselves or others but do not address perspectives that explain why individuals may be protected from suicide (Durkheim 1966 [1897]; Ellison, Burr and McCall 1997; Stack 2000) or deterred from committing homicide (Cullen 1994; Hirschi 1969) because of their relationships with others. Instead, the authors re-frame the relationship between religion and suicide as an issue of culture. Protestant Christianity is conceptualized as a cultural factor that causes individuals to have a greater amount of self-blame and therefore Protestant Christian nations have proportionally more suicides to homicides ((Whitt 1994c; Whitt et al. 1972).

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hospital, the weight of the weapon, or an inch between a lethal and non-lethal stab wound. Kusher (1985) also argues that an individual's intention to take his/her own life cannot be imputed from a failed suicidal act.

Although some of these theoretical shortcomings and empirical inconsistencies between cross-national samples and samples of counties within the U.S. are beyond the scope of the current study, the goal of this research is to move the literature forward on the stream analogy of violence in four ways. First, by utilizing multilevel analysis, some of the empirical inconsistencies between international samples and samples of jurisdictions within a single country can potentially be bridged in the analysis of both within – and between – country effects. Second, religious homogeneity of a nation is introduced into the model to integrate Henry and Short's (1954) perspective on the effects of social integration and regulation into a test of Unnithan and his colleagues' (1994) iteration of the stream analogy of lethal violence. Third, as a macro-level strain theory, Unnithan and colleagues' (1994) framework may benefit from integrating social support (Cullen 1994) as a contingency within their causal model as social support may mitigate the stressors outlined by the authors. Therefore, an aggregate measure of social support is included in the model predicting the production of violence in this research. Finally, although other authors have implicated specific cultures as having values that direct lethal violence toward homicide or suicide (Cash 1941; Corzine and Huff-Corzine 1994; Hackney 1969; Huff-Corzine et al. 1991; Whitt 2010; Whitt et al. 1972), no *general* cultural value or value system has been explicated as shaping the direction of violence. This research utilizes Markus and Kityama's (1991) distinction between the independent and interdependent conceptualization of the self to explicate a general cultural value system that directs lethal violence toward either homicide or suicide through the mechanism of the self-serving attributional bias.

CULTURE AND ATTRIBUTIONAL STYLE

Markus and Kitayama (1991) argue that cultural values greatly affect individuals' conceptualization of 'self' in relation to others. The authors put forth two ideal types of the conceptualization of the self: the independent self and interdependent self. The independent self is typically found in Western cultures, in which individuals are expected to be more self-centered in an attempt to realize their own goals and express their individuality with proportionally less concern for the goals and attributes of the others. The interdependent conceptualization of self, found in most non-Western nations, orients individuals to suppress individuality, attune themselves to the desires and goals of others and attempt to fit into their role in a social situation rather than express their opinion or disrupt harmonious social relations. In short, the independent conceptualization of self influences individuals to privilege personal concerns at the expense of others while the interdependent conceptualization of self influences individuals to privilege the concerns of others at the expense of oneself.

Crucially for Unnithan and colleagues' (1994) contention that attributional style affects the direction of violence, culturally-based conceptualizations of self affect the aggregate of individual attributional styles within a society. Specifically, individuals living in independent and interdependent societies differ in the extent to which they attribute successes and failures to internal (personal) causes or external (contextual) causes. In this research, the role of the self-serving attributional bias is examined in relation to the direction of lethal violence within society.

Although a self-serving attributional bias appears to be a nearly universal human trait, the self-serving bias varies by degree across populations (Anderson 1999; Bornstein et al. 1998; Gelfand et al. 2002; Kitayama et al. 1997; Markus and Kitayama 1991; Mezulis et al. 2004; Nurmi 2001). In a meta-analysis of 266 studies, individuals in nearly every sample selectively interpreted events in order to maintain a positive view of themselves (Mezulis et al. 2004), exhibiting a self-serving bias. However, a few groups did not always interpret events in a self-serving manner, such as people living in Asian cultures (especially Japan), people living with depression and/or anxiety and adult women (also see Batton and Ogle 2003).

Importantly for this study, individuals with an interdependent conceptualization of self are more likely to modestly interpret successes and failures, viewing success to be contingent upon external (contextual) factors while attributing failure to personal deficiency in effort or ability to a greater extent than individuals living in societies with an independent conceptualization of self. Individuals with an independent conceptualization of self display a stronger self-serving attributional bias (Markus and Kitayama 1991). Cross-national research has confirmed the contentions of Markus and Kitayama (1991) as individuals living in western countries display a stronger self-serving bias in their interpretation of life events. For instance, in comparison with Japan (Bornstein et al. 1998; Gelfand et al. 2002; Kitayama et al. 1997; Markus and Kitayama 1991), China (Anderson 1999) and Finland (Nurmi 2001), individuals living in the Unites States display a stronger self-serving attributional bias in their interpretation of events. Menzulis et al. (2004) interpret the self-serving attributional style as

protective against problems with internalization, such as depression and anxiety, promoting positive mental health.

At the interpersonal level, theory and empirical evidence suggest that the way individuals conceptualize the self in relation to others has an impact on whether they externalize or internalize their frustrations. 'Self-schemas' are conceptualized on a continuum between an individual completely privileging themself over others and completely privileging others over oneself. At the extreme ends of this continuum, individuals are at a greater risk to have externalization problems or internalization problems, respectively (Rosenfield, Lennon and White 2005; Rosenfield, Phillips and White 2006).

Individuals who see themselves as interconnected with others and who privilege the concerns of the group over their own are more likely to internalize their failures and frustrations. Those who privilege others over themselves are more likely to have depressive symptoms, anxiety and suicidal thoughts as they often blame themselves for not only their problems but even see themselves as responsible for the difficulties of others (Rosenfield et al. 2005; Rosenfield et al. 2006). Having a 'self-schema' that demotes the concerns of one's self while privileging the concerns of others therefore is more likely to put individuals at risk for suicide rather than homicide as they are more likely to internalize failures and frustrations.

At the other end of the continuum, individuals who privilege themself and personal concerns over the needs of the group are at a greater risk for externalization of their frustrations:

> The belief that one is superior to others makes it easier to act against others' interests. Those who see themselves as more important and valuable than other people are less likely to blame themselves for difficulties and more likely to see others as the source of problems. Other people become impediments to achieving their desired outcomes. It follows that schemas increasing the risk of externalizing behaviors decrease the likelihood of internalizing problems. Extreme assumptions of entitlement and superiority make hurting oneself inconceivable (Rosenfield et al. 2006: 165).

Although the research on self-schemas (Rosenfield et al. 2005; Rosenfield et al. 2006) and the independent and interdependent conceptualization of self (Markus and Kitayama 1991) are somewhat distinct, the underlying theme between these two lines of theory is directly relevant to Unnithan and colleagues' (1994) contention that attributional style affects the direction of lethal violence. Individuals who view themselves as disproportionally more important than the members of their social group attribute failures and frustrations as caused by others (the self-serving attributional bias). Individuals living in cultures with an independent conceptualization of self are predisposed to outward attributions of blame while people living in cultures with an interdependent conceptualization of self are more prone to inward attributions of blame. Following the logic of Unnithan and colleagues' theory, individuals who privilege themselves over others are more likely to attribute failure and frustrations as caused by others and therefore more likely to externalize violence in the form of homicide. Individuals who privilege others over themselves are more likely to attribute frustrations and failures to themselves and internalize violence in the form of suicide. Therefore, these societal conceptualizations of self are integrated into this test of Unnithan and colleagues' iteration of the stream analogy.

HYPOTHESES

Based on Unnithan and colleagues' (1994) theory, the present cross-national study investigates the effects of structural and cultural factors on the production of lethal violence, measured as the LVR, and the direction of lethal violence, measured as the SHR. The authors hypothesize that systemic frustration and economic hardships result in negative life experiences, causing lethal violence (a higher LVR) within a society. Based on this hypothesis, economic deprivation and systemic frustration are expected to increase lethal violence within a society. Also, subsequent research has indicated that social disorganization may be a predictor of total lethal violence (He et al. 2003; Wu 2004). Social disorganization falls under the general proposition that "socially patterned sources of frustration, stress, and negative life events" cause lethal violence (Whitt 1994d: 96). Therefore, it is expected that measures of social disorganization will also predict a greater amount of lethal violence within a society.

Unnithan and his colleagues conceptualize the cause of lethal violence as a result of individual stressors and 'strains' (Merton 1938). However, following Cullen's (1994) claim that social support may reduce criminal involvement, it is expected that social support may decrease the amount of lethal violence in society by mitigating the aforementioned stressors and frustrations hypothesized to cause lethal violence. Therefore, we expect social support to be negatively related to the production of lethal violence in a society.

H_1: Economic stressors will be positively associated with the production of total lethal violence (the LVR).

H_2: Economic inequality will lead to a greater amount of lethal violence (a higher LVR) within a nation.

H_3: Social disorganization will cause a greater amount of violence (a higher LVR) within a society.

H_4: Social support will mitigate social stressors and frustrations, reducing the amount of lethal violence within a society.

As for the direction of lethal violence, the authors (Unnithan et al. 1994) hypothesize that an individual's attributional style will influence whether violence is directed toward homicide or suicide. One of the most consistent findings in cross-national tests of this theory is that economic development (a proxy for modernization) directs lethal violence toward suicide as individuals are hypothesized to see themselves as in control of their fate, internalizing blame for frustrations and failures. Following Whitt (2010), modernization is expected to direct lethal violence toward homicide, while less modern societies are expected to have proportionally more homicides as a percent of lethal violence. Individuals living in countries with lower levels of economic development are more likely to see circumstances outside of their control, causing them to externalize blame for failures and frustrations.

Another consistent finding in cross-national research on the stream analogy of lethal violence is that economic inequality is associated with more homicides as a proportion of lethal violence. Inequality within a society is hypothesized to cause a greater number of individuals to feel alienation and a sense of unfairness (Blau and Blau 1982). This fosters outward attributions of blame, which direct violence toward homicide rather than suicide.

Conversely, lower levels of income inequality are hypothesized to direct lethal violence toward suicide as individuals would not have the blatantly unfair conditions to blame for their frustrations and failures.

Following the preceding discussion on the cultural conceptualization of self and attributional style, we would expect culture to have a significant impact on the 'direction' of lethal violence. Societies with cultural values favoring an independent conceptualization of self are predicted to have higher rates of homicide as a proportion of lethal violence (a lower SHR) and, conversely, societies with cultural values favoring an interdependent conceptualization of self should have higher rates of suicide relative to total violence (a higher SHR).

This research will also address the under-studied link between religious factors and their influence on the direction of lethal violence within the stream analogy literature. Whitt et al. (1972) found that Catholic countries tended to have fewer suicides as a proportion of total violence than Protestant nations. Theoretically, Whitt (1994c) hypothesizes that Protestant religious traditions foster a greater amount of self-blame than do Catholic religious traditions. It is expected that Protestant countries have a higher SHR than Catholic countries. However, the only research demonstrating this finding used simple bivariate analysis. Also, it is possible that religious factors influencing homicide and suicide are not the same and the nature of the relationship between religion and homicide or suicide has changed in the half century since these data were collected (Whitt et al. 1972). This contradicts the Durkeimian (1966 [1897]) tradition that focuses social integration and regulation more than the content of

Protestant and Catholic belief systems. This research offers an attempt to differentiate between social integration based on religion and cultural differences in attribtutional style based on religion.

Although Unnithan et al. (1994) conceptualize their theory as an update of Henry and Short's (1954), the authors largely ignore Henry and Short's emphasis on integration and regulation as social forces that direct lethal violence toward homicide or suicide. It is difficult to capture Henry and Short's proposition that an individual's position within the social hierarchy affects the direction of violence within a cross-national study. However, Henry and Short also hypothesize that integration into the relational system may direct lethal violence toward homicide as individuals who are more socially controlled are more prone to homicide. Therefore, we expect religious integration to direct violence toward homicide as religious integration protects against suicide (Durkheim 1966[1897]; Ellison et al. 1997) while excessive integration can cause an outward attribution of blame resulting in homicide (Henry and Short 1954).

H_5: As societies modernize, lethal violence is increasingly directed toward suicide rather than homicide.

H_6: Inequality directs lethal violence toward homicide within a society.

H_7: Countries with cultures favoring external attributions of blame (cultures with an 'independent' conceptualization of self) will have a lower proportion of suicides relative to total lethal violence (a lower SHR) than countries with cultural values

favoring internal attributions of blame due to an 'interdependent' conceptualization of self.

H_8: Countries with a higher proportion of Protestants will have cultural values fostering self-blame at a higher rate than countries with a higher proportion of Catholics, leading to higher SHR in those Protestant countries.

H_9: Religious integration will direct lethal violence toward homicide within a society (a lower SHR).

DATA AND METHODS

Data Sources and Sample

Unnithan et al. (1994) conceptualize their version of the stream analogy of lethal violence exclusively at the macro-level, as only explaining the production or amount of lethal violence and the direction of lethal violence within a group or society. Therefore, utilizing data from a cross-national sample allows for an assessment of the structural and cultural conditions explicated within this theory. Several data sources are culled together to adequately test the preceding hypotheses cross-nationally. Data were derived from the World Health Organization (WHO 2013c) the World Bank (2013a, 2013b, 2013c), The Standardized World Income Inequality Database compiled by Solt (2009), the United Nations (1990-2013, 2011), the Organisation for Economic Co-Operation and Development (OECD 2009, 2013) social indicators, measures of ethnic and linguistic fractionalization compiled by Alesina et al. (2003), the Association of Religion Data Archives (Zeev and

Henderson 2013), and Hofstede and colleagues' (2010) research on cross-national cultural dimensions.

Unfortunately, data limitations on key independent and dependent variables preclude drawing a true random sample of nations.[9] In this research OECD nations are utilized for the sample. Three OECD nations are excluded because of missing data on either the dependent variables (suicide and homicide rates) or the cultural dimension ("individualism") found in Hofstede et al. (2010). In this study, available data provide measures for up to 16 observation points for 31 OECD countries from 1990 to 2005. The majority of these countries are located in Europe (22), but the sample also includes four countries in the 'Americas' as well as Israel, Japan and South Korea.

Unfortunately, data were not available for all countries at every possible time point from 1990 to 2005. Missing data on the dependent variables (a combination of age-standardized homicide and suicide rates) and key independent variables (divorce and marriage rates, Gross Domestic Product (GDP) per capita, and religious affiliation) restricts these analyses to 434 country-year complete observations when utilizing listwise deletion (out of a potential 496 country-year observations if data were available for each year of the analysis for all countries). 'Appendix A' provides a list of the OECD countries included in these analyses as well as the number of full years included in the analysis for each country.

[9] Without a true random sample, the results of this study will not be generalizable to the entire population of nations. Although some would suggest that reporting statistical significance in this circumstance is inappropriate, He et al. (2003), following Bennet (1991), suggest that statistical significance is a way to determine the relative importance of predictors within a model, as statistically significant results can indicate which factors appear to be influencing the dependent variable within the sample.

Dependent Variables

Country-level age-standardized homicide and suicide rates (per 100,000 of the population) available through the WHO's 'Mortality Data base' (World Health Organization 2013c) are utilized for this research. Age-standardization of homicide and suicide rates takes a nation's age distribution into account, which is a possible confounding factor in studying homicide and suicide cross nationally (Chon 2013; Pampel and Williamson 2001). Homicide data provided by the WHO have been established as being of high quality compared to other cross-national homicide data (Lafree 1999). Although there are still concerns of under-reporting of suicide (Rockett, Kapusta and Bhandari 2011; van Poppel and Day 1996), the WHO is the largest repository of international suicide statistics and is widely used by scholars studying international suicide rates.

In order to test Unnithan and colleagues' (1994) theory on the stream analogy, two dependent variables are calculated from age-standardized suicide and homicide rates, the 'Lethal Violence Rate' (LVR) and the 'Suicide-Homicide Ratio' (SHR).The LVR is simply a measure of the total amount of lethal violence within a country in a given year. The LVR is calculated as: Suicide Rate + Homicide Rate. The SHR is a measure indicating the proportion of total violence that is expressed as suicide. The SHR is calculated as: Suicide Rate/(Suicide Rate + Homicide Rate). Preliminary diagnostics indicated a slight negative skew (an elongated tail to the left) in the SHR distribution. After examining several data transformation techniques, the SHR was cubed to obtain a more normal distribution (Fox

1991: 47-48). No evidence of heteroskedasticity was found in the residual diagnostics after transforming the dependent variable.

Independent Variables

Because the LVR and SHR are hypothesized to be affected by different social forces and distinct social processes, the discussion of the models predicting the LVR and SHR are separated in the following discussion of the independent variables. First, the factors influencing total violence within a society (the LVR) are discussed.

The LVR Models

As stated before, Unnithan et al. (1994) hypothesize that social stressors and frustrations are the cause of lethal violence. This research examines the effects of economic stressors (percent unemployment), systemic frustration (the Gini index), social disorganization (the proportion of divorce rates to marriage rates and ethnic/linguistic 'fractionalization'), a measure of social support (aggregate social expenditures) and a two controls for modernization (percent of the population living in urban areas and GDP per capita) on the total lethal violence rate (LVR).

Following the example provided by He et al. (2003), unemployment is included as an economic stressor predicting the LVR. Data for this variable are utilized from the UN's (1990-2010) *Statistical Yearbook*. One potential issue recognized by previous researchers using UN unemployment data is that cross-national unemployment rates are not always comparable as countries use different definitions regarding who is officially unemployed and use different methods of calculating the unemployment rate (He et al. 2003). However, the

multilevel model utilized in this research (discussed in detail later) is able to calculate both within – and between – country effects of unemployment, which allows us to compare 'apples to apples' at least within nations over time.

Gini index values, the measure of systemic frustration, are derived from The Standardized World Income Inequality Database compiled by Solt (2009, 2013). The major advantage of this dataset is the relatively few missing data points. A persistent problem in longitudinal analysis using Gini coefficients is the amount of missing data. Solt utilizes several well-established sources of the Gini index to calculate a single Gini index value for each country at each time point by utilizing advanced data imputation techniques to fill in missing data points. Preliminary analyses conducted on this measure of income inequality confirmed that the Gini index provided by Solt is highly correlated ($r = .97$) with the Gini index reported by the World Bank (2013a) over the period of interest, indicating that both measures are indicating a similar underlying dimension of income inequality.

Two measures of social disorganization are included in this model. Following He et al. (2003), divorce and marriage rates are utilized from the United Nations (1990-2010) *Statistical Yearbook* and combined into a single measure by dividing the number of divorces within a single year by the number of marriages. Although using this calculation may make the interpretation of the relationship between 'divorce' and the LVR more difficult, this measure makes data from countries with different marriage patterns more comparable, as the number of marriages within a country increases the hazard of divorce within a population. The second measure of social disorganization is ethnic and linguistic 'fractionalization.' This

measure is derived from Alesina and colleagues' (2003) separate measures of ethnic fractionalization and linguistic fractionalization. Essentially, measures of fractionalization indicate how diverse a population is on a particular characteristic, with higher scores representing greater population heterogeneity. The separate measures of ethnic and linguistic fractionalization are combined into a single measure of population heterogeneity.[10]

Social support (Cullen 1994), which is hypothesized to decrease the amount of lethal violence within society, is measured as the mean of aggregate social expenditures within a country as a percentage of GDP. These data are derived from *OECDExtracts* (OECD 2011), which provides data on social expenditures for all 34 OECD nations. Also included in the LVR models are two measures of modernization (Whitt 2010). GDP per capita (in 2005 constant international dollars extracted from the World Bank 2013b) and the percentage of the population living in urban areas, which is derived from the United Nations (2011) are the two measures of modernization included in the model.

The SHR Models

Unnithan et al. (1994) hypothesize that an individual's attributional style affects the direction of lethal violence toward either homicide or suicide. In the model predicting variation in the SHR, economic inequality (the Gini index), modernization (percent of population living in urban areas and GDP per capita in constant 2005 international dollars),

[10] Although research on cross-national homicide rates (Antonaccio and Tittle 2007) has included religious fractionalization as a unitary measure of population heterogeneity, preliminary analyses indicated that religious fractionalization may have a different (or even opposite) effect on the LVR (and SHR) than ethnic and linguistic fractionalization within this sample. Also note that data on fractionalization is collected at only one point in time during the late 1980s and 1990s (depending on the country), representing a stable, time-invariant measure of ethnic and linguistic fractionalization.

cultural conceptualization of the independent/interdependent self (individualism), cultural influences affecting self-blame and external blame (percentage of the population Protestant and percentage of the population Catholic, respectively), and religious integration (Herfindahl index of religious adherence) are conceptualized as the main factors directing lethal violence toward homicide or suicide. The model will also include ethnic and linguistic fractionalization as a control for population heterogeneity. Finally, preliminary analyses showed that American countries have disproportionate amounts of lethal violence expressed as homicide relative to the other countries in the sample. Therefore, a dichotomous indicator for American countries, coded as '1' for the countries from North, Central and South America, with the rest of the nations coded a '0' is included in the SHR model (See 'Figure 4').

The most consistent finding in cross-national research on the SHR is that higher economic inequality directs lethal violence toward homicide while economic development directs lethal violence toward suicide (Chon 2013; He et al. 2003; Unnithan and Whitt 1992; Unnithan et al. 1994). This research also includes a measure of urbanization (percent of population living in urban areas) in the models predicting the SHR as an indicator of modernization, which is predicted to direct lethal violence toward suicide (Whitt 2010). These variables are derived from the same sources mentioned above in the section discussing the LVR models.

Crucially for the test of cultural influence on the direction of lethal violence, the independent conceptualization of self (Markus and Kitayama 1991) is operationalized as

individualism, a measure extracted from Hofstede and colleagues' (2010) cross-national research on cultural dimensions. The individualism measure is utilized as it captures the extent to which individuals view themselves as either subservient to the group (interdependent self) or as distinct individuals who should express their individual tastes, desires and qualities (independent self). This concept is measured on a continuum ranging roughly between zero and 100, with scores closer to zero representing very low levels of individualism and scores closer to 100 representing very high levels of individualism, which embodies the continuum between the ideal types of the interdependent and independent conceptualization of self, respectively. Individuals living in countries with higher individualism scores are hypothesized to more closely resemble individuals with an independent conceptualization of self than individuals living in countries with lower individualism scores, as measured by Hofstede et al. (2010).

Individualism scores are constructed utilizing survey data across 76 nations and territories collected from IBM employees. The individualism dimension is a composite of six questions asking employees about work preferences, with a reliability index of .77 between the items (Hofstede and Hofstede 2013). The individualism dimension seems to be a relatively good measure of the dimension as a meta-analysis of cultural data indicates a correlation of .86 between Hofstede's measure of individualism and subsequent research measuring individualism. These results indicate that the individualism measure has decent construct reliability and external validity (Taras, Steel and Kirkman 2012).[11] However, this

[11] However, it should be noted that Hofstede and colleagues' (2010) claim that cultural values change very little over time is challenged by the research of Taras et al. (2012). Research conducted in the first decade of the 21st

measure is not without its critics. Some have challenged Hofstede's methods, assumptions concerning measurement of culture at the national level and culture's ability to predict individual behavior (Williamson 2002). It should also be noted that the data collected by Hofstede et al. (2010) were collected through convenience sampling of IBM employees. It is unlikely that IBM employees are representative of a country's population as a whole, which makes these data questionable in making cross-national comparisons. These data are used because Hofstede and colleagues' research is the largest and most extensively cited cross-national study on culture specifically purporting to measure individualism.

Following the work of Henry and Short (1954), religious homogeneity (a Herfindahl index of religious affiliation) is hypothesized to direct lethal violence toward homicide. Ellison et al. (1997) hypothesize that the religious homogeneity of an area is a measure of social integration within a group. Following these researchers, a measure of religious homogeneity of a country is calculated utilizing data from the Association of Religion Data Archives (Zeev and Henderson 2013) and included in the model to capture the effects of social integration. Also, the percentage of Catholics and the percentage of Protestants within a population is included in this model as a measure of cultural values influencing the 'direction' of lethal violence (the SHR). The percentage of Catholics and Protestants is used in an attempt to differentiate the cultural values associated with these religions (see Whitt 1994c) and the effects of religious integration discussed above.

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century indicates only a .73 correlation between the meta-analytic score and Hofstede and colleagues' individualism dimension, indicating that cultural values may be changing within the countries in the sample, which is not measured in Hofstede and colleagues' research.

Finally, and a measure of ethnic and linguistic 'fractionalization' is also included in the final model to control for the effects of population heterogeneity. Previous cross-national studies on homicide have included similar measures (Antonaccio and Tittle 2007), although this study attempts to tease out the distinct effects of religious homogeneity and ethnic/linguistic heterogeneity on the SHR in two separate measures. A dichotomous measure representing North, Central and South America is included as these countries tend to express violence as homicide at a higher proportion of lethal violence than other regions within this sample (Rezaeian 2009). See 'Appendix B' for more detail on the data sources and measurement of the dependent and independent variables.

Analytic Strategy

In this research, a multilevel modeling (MLM) procedure is used to analyze the effects of time-varying and time-invariant social and economic covariates on the LVR and SHR within 31 countries. The MLM (also known as a mixed model, hybrid model or decomposition model) allows one to effectively assess multiple observations over time nested within units (in this research, countries). The model specification used in this analysis is referred to as a decomposition (or hybrid) model which allows the researcher to estimate the effect of covariates on the outcome variable within countries over time and across countries, simultaneously. At 'level one,' the model accounts for observations across time (years within countries) and is able to assess how change in the independent variable affects the dependent variable over time within a single unit (country). At 'level two,' the model accounts for variation across units (countries) and estimates the effect of predictors on the

variation of the dependent variable across units, akin to a cross-sectional analysis. Therefore, the model is able to capture the effect of predictors both within units over time and between units. The MLM procedure produces estimated coefficients similar to traditional multivariate statistical techniques such as Ordinary Least Square (OLS) regression, but allows researchers to investigate longitudinal data that cannot be effectively analyzed in OLS regression due to violating the OLS assumption of independence of error terms. The MLM procedure was conducted using the HLM 7 statistical program.

Before adding covariates to the model, growth curves for both the LVR and SHR were modeled using year as the measure of time. The initial year (1990) was coded as '0' with each subsequent year assigned the number representing the number of years after 1990 (from 0 to 15 for 2005). After centering the re-coded year variables at the grand mean, three models were analyzed for the both the LVR and SHR model to determine the appropriate functional form for time. In models predicting the LVR and SHR, the growth model estimating the effect of time on the dependent variable using the contemporaneous year was the best fit for the data compared to models using the squared and cubed function of year.

In an attempt to reconcile some of the disparate findings between research that analyzes the LVR and SHR within a single country (Lanier 2010; Wu 2004) and cross-national tests of the stream analogy (Chon 2013; He et al. 2003; Unnithan et al. 1994; Unnithan and Whitt 1992), predictors of the LVR and SHR are included in both level one and level two of the analysis to determine how changes within a country and differences between countries affect variation in the amount and direction of lethal violence. The level

one data are comprised of country-year units. At level one, the time-varying independent variables are centered at the group mean to ease interpretation of the within-country effects as well as reduce potential problems with multicollinearity (see Brauer 2009; Rosenfeld, Fornango and Rengifo 2007 for examples of this procedure). A variable is group-centered by subtracting the overall mean for each variable (for each country) from the observation for each year. The group-mean centered measure represents deviations from the mean over time for each country. In models predicting variation in the LVR, group-centered measures of GDP per capita, the Gini index, divorce rates, and unemployment are included at level one. In models predicting the SHR, group centered measures of GDP per capita and the Gini index are included at level one.

The remaining variables are either observed at only one point in time (individualism, ethnic/linguistic fractionalization and the dummy variable representing the 'Americas') or exhibited relatively little change during the time period studied (the percentage of Catholics or Protestants within a country, religious homogeneity, aggregate social expenditures, and percentage of the population living in urban areas). Therefore, these variables are included exclusively at level two. At level two, the mean for every variable included in the model for each country (including variables included at level one) is calculated for all available time points and then each variable is centered at the grand mean. This procedure reduces the potential impact of missing cases while allowing for between-country comparisons of the predictors in the models.

Preliminary Analyses

Since 1990, the total lethal violence rate, LVR, has declined in most of the countries in the sample. Peaking at a high of 16.91 in 1994, the overall mean LVR (across all countries) declined to 13.92 in 2005. With a few notable exceptions, both homicide and suicide rates have been declining across these 31 nations during this time period. Poland, Chile, Mexico, Japan and South Korea display somewhat different trends as suicide rates have increased within those nations between 1990 and 2005, while suicide rates have been decreasing in other nations. Chile, South Korea, Israel, Belgium, Portugal and Ireland are also notable for the fact that the last recorded homicide rate in these countries is higher than the homicide rate recorded in 1990. The most apparent secular upward trend in homicide rates is noted in South Korea and Chile. (See 'Table 1' for the overall means by country for measures incorporated into these analyses, including the homicide rates, suicide rates, the LVR, the SHR and the cubed transformation of the SHR from 1990 to 2005.)

Overall, the SHR has increased slightly since 1990, as lethal violence is increasingly expressed as suicide rather than homicide within these 31 nations. In 1990, the mean for the SHR was .83, .02 lower than the mean SHR in 2005 of .85. Although the SHR has increased during this time period, the trend has not been even within all countries. For example, Mexico's SHR has more than doubled in this time period (.12 in 1990 to .30 in 2005), while most countries experienced relatively little change from 1990 to 2005 in their SHR. There is relatively little variation and most countries exhibit stochastic trends, reflecting the relatively small changes in homicide and suicide rates from year to year within a country. Between

countries, however, there is a greater amount of variation in the SHR. Ranging from Japan's SHR of .98 in 2005 to Mexico's .12 in 1990, nations varied substantially in the amount of lethal violence expressed as suicide. In spite of this limited variation over time, there is statistically significant variation in the SHR when regressing time (year) on the SHR in the multilevel model (not shown). (See 'Figure 2,' 3' and '4' for the overall trends in the LVR and SHR during this time period.)

Although these nations tend to share similar characteristics, there is a large amount of diversity among the countries in this sample across predictors of the LVR and SHR. For instance, Norway and the United States represent some of the wealthiest nations in the world – as each of these countries exceeded $40,000 GDP per capita (in constant 2005 international dollars) while Mexico, Chile, Estonia, Slovakia and Poland all recorded a GDP per capita of less than $10,000 during this time period. Like GDP per capita, the Gini index also varied considerably from country to country, with the highest rates of inequality consistently found in Mexico, Chile and the United States. Both GDP per capita and the Gini index tended to increase over time (1990 to 2005) in this sample. 'Table 2' provides descriptive statistics for all variables included in either the SHR or LVR models.

Additionally, initial analyses were conducted to determine whether there were issues with multicollinearity, outliers and influential cases. A bivariate correlation matrix did not indicate any issues with multicollinearity, as none of the predictors of either the LVR or SHR exceeded a correlation of -.62. Also, supplemental OLS analyses did not indicate a Variance Inflation Factor (VIF) score above three, indicating that multicollinearity was not a problem

within the model. However, supplemental OLS regression output measuring the 'Cook's D' statistic of influential cases indicated that all of the country-year observations for the United States had excessive leverage on the results of the OLS models. In the MLM procedure, models including the U.S. and not including the U.S. were analyzed. Both models returned results that are substantively the same, supporting the robustness of these findings. [12] Therefore, the results displayed in Tables 3 and 4 include the U.S. cases.[13]

RESULTS

Models Predicting the LVR

'Table 3' displays the findings from the multilevel regression analyses for the LVR, the total violence measure. A series of nested models are presented in that table. Model 1 includes indicators of economic strain and modernization: unemployment and GDP per capita as predictors at both level one (within-country over time effects) and GDP per capita, unemployment and percent of the population living in urban areas at level two (between-country effects) of the model. Neither GDP per capita nor unemployment is statistically significant as a predictor of the LVR at level one. At level two, higher rates of unemployment

[12] However, in the case of the relationship between individualism and the SHR^3 outcome in 'Model 4' of Table 4, the parameter estimate is closer to statistical significance with the U.S. cases in the model. The U.S. is left in the model, but the implications of leaving the results without the U.S. in the model are discussed in the Discussion and Conclusion section. In the final models for both the SHR^3 and LVR, the substantive results are the same, although the statistical power of the predictors in the LVR models may be reduced without the cases from the U.S.

[13] The appropriate lag for the time varying measures was tested. Although the three year lag was the best fit for the relationship between GDP and LVR according to the results from a preliminary analysis, there was no substantive difference between the full models with the lagged and non-lagged GDP per capita measure. The contemporaneous year is used for these models as there is no compelling argument found in the literature on the stream analogy or theoretical reason that a three year lag should be used to predict variation in the LVR.

are found to decrease the LVR. The theory predicts that unemployment should be positively related to the amount of lethal violence. These findings contradictory to the hypothesis may be explained by the inconsistent measurement of unemployment across countries (He et al. 2003), as within country variation in unemployment rates is not associated with the LVR.

In Model 2, the Gini index was added as a predictor at both level one and level two of the model. In this model at level one, the Gini index is not a statistically significant predictor of the LVR and the parameter estimates of the other predictors are substantively the same as in Model 1. On level two of the model, unemployment ($p < .05$), GDP per capita ($p < .05$), and the Gini index ($p < .05$) are all statistically significant predictors of the LVR. However, only GDP per capita predicted the LVR in the posited direction ($b = -.0004$). Unemployment rate ($b = -.63$) and the Gini index ($b = -.35$) were negatively associated with the LVR, indicating that countries with higher unemployment rates and higher rates of income inequality have less violence than countries with lower rates of unemployment and income inequality. These results are the opposite from previous cross-section research findings (He et al. 2003; Unnithan et al. 1994; Unnithan and Whitt 1992). Although the statistically significant relationship between unemployment and the LVR is possibly due to inaccurate reporting between countries (He et al. 2003), the relationship between the Gini index and the LVR is problematic for the theory within this sample.

Measures of divorce (at level one and level two) and ethnic and linguistic fractionalization (level two) are introduced into the Model 3 to test whether greater social disorganization is associated with an increase in the LVR. Net of the effects of other

variables at level one, GDP per capita and unemployment rate remain substantively the same as previous models in Table 3. However, both the divorce to marriage ratio and the Gini index are statistically significant ($p < .05$) predictors of the LVR in the predicted (positive) direction at level one, indicating that as divorces become proportionally more likely than marriages within a country and as income inequality increases, lethal violence increases as well. At level two, GDP per capita remains a significant predictor of the LVR between countries in the posited direction ($b = -.0003$, $p < .05$) between countries, indicating that more economically developed nations are less violent overall. Urbanization is also predicted to decrease the amount of violence within society and the coefficient is accordingly negative and is statistically significant ($b = -.22$, $p < .10$, two-tailed test). Also at level two, countries with proportionally more divorces in relationship to marriages have higher rates of lethal violence ($b = 30.35$, $p < .01$). Consistent with the graphic displays of the LVR trends, the LVR is also statistically significant with the time measure ($b = -.59$, $p < .01$). Unemployment, the Gini index, and ethnic and linguistic fractionalization are not significant predictors of the LVR at level two of this model.

In the full model (Model 4) predicting the LVR, a measure of mean aggregate social expenditures over the 16 year time span is introduced into the model as a measure of social support. The results of Model 3 and Model 4 are substantively identical, except that GDP per capita ($b = -.0002$, $p = .323$) and urbanization ($b = -.19$, $p = .104$) cease to be statistically significant predictors of the LVR. Aggregate social expenditures have the hypothesized effect on the LVR as increases in social expenditures is associated with a decrease in lethal

violence within a society (b = -.37, p < .10, two-tailed test) net of the influence of the other independent variables in the model.

A final trimmed model (Model 5) presents the results of a model without GDP per capita at either level one or level two of the model. Although preliminary data analysis did not indicate any problems with multicollinearity, this model (Model 5) suggests that GDP per capita, urbanization and aggregate social support explain a similar portion of the variation in the LVR in the previous model (Model 4). In both Models 4 and 5, aggregate social expenditures appears to be a stronger predictor of low levels of lethal violence than either of the modernization measures (GDP per capita and urbanization), indicating that social support may the most proximate factor of the three. Overall, the LVR models suggest that the divorce to marriage ratio and the Gini index are the two factors producing lethal violence within a society, while social support (aggregate social expenditures as a percentage of GDP) and modernization (percentage of population living in urban areas in Model 5) are protective against stressors and lethal violence.

Models Predicting the SHR

'Table 4' presents the findings from a series of nested models testing the effects of structural and cultural aspects of these nations on the direction of violence (note higher values of the SHR are associated with more suicide as a proportion of total lethal violence). Four models are specified to parse-out the effects of economic, cultural and religious variables on the SHR[3]. In Model 1, GDP per capita and the Gini index are included at both level one and level two while urbanization is included only at level two. At level one, neither

GDP per capita nor the Gini index are statistically significant predictors of change in the SHR^3 within nations. At level two, we find as predicted that countries with higher rates of income inequality have a lower SHR^3 than countries with lower rates of income inequality (b = -.02, p <.01). However, GDP per capita and urbanization are not significant predictors of the SHR^3 in the Model 1.

In Model 2, individualism, percent Catholic and percent Protestant are included in the model as measures of culture. GDP per capita (b = .000007, p < .10) and the Gini index (b = -.02, p < .01) are significant predictors of the SHR^3 in the posited direction. However, individualism, percent Catholic, and percent Protestant are not statistically significant predictors of the SHR^3. These results indicate that cultural values are not strongly associated with the direction of lethal violence within these countries.

Model 3 includes measures of religious homogeneity and of fractionalization along ethnic and linguistic lines. None of the predictors at level one of the model is a statistically significant predictor of the SHR. However, at level two of the analysis (between-country effects) the Gini index (b = -.03, p < .01), religious homogeneity (b = -.25, p < .05) and ethnic/linguistic fractionalization (b = -.42, p < .01) all display the hypothesized effect on the SHR^3, as inequality, religious homogeneity and ethnic/linguistic heterogeneity are associated with a lower SHR (violence directed toward homicide). GDP per capita (b = .000007, p < .05) and urbanization (b = .005, p < .05) are also statistically significant predictors of lethal violence in the predicted direction at level two, indicating that modernization directs lethal violence toward suicide. Although not meeting the conventional p-value of .05 used in the

social sciences, the relationship between individualism and the SHR^3 also approaches statistical significance ($p = .16$, two-tailed test) and the coefficient indicates that individualism's effect on the direction of lethal violence is in the posited direction ($b = -.001$). However, percent Catholic is positively associated with the SHR^3 ($b = .18$, $p < .01$), the opposite of the hypothesized relationship, while the relationship between the SHR^3 and percent Protestant does not reach statistical significance.

In the final model (Model 4), a dummy variable representing the countries of North, Central and South America are added into the model. Although this variable fails to reach statistical significance ($b = -.17$, $p = .22$), it improves the model fit ($x^2 = 3.74$, $p = .051$) and individualism approaches statistical significance ($b = -.002$, $p = .103$, two tailed test) as hypothesized, indicating that the societies with cultural values favoring an independent conceptualization of self directs lethal violence toward homicide. The rest of the model is substantively the same as Model 3.[14]

DISCUSSION AND CONCLUSION

Since Unnithan and colleagues' (1994) iteration of the stream analogy of lethal violence, there have been relatively few cross-national tests of the theory. Also, cross-national research on the stream analogy has also been limited to cross-sectional data analysis. The current research provides a longitudinal cross-national examination of the stream analogy of violence to test the latest iteration of the theory in a sample of 31 nations. This

[14] As indicated in footnote 12, without the U.S. in the model, individualism is not as strong of a predictor of the SHR^3. Subsequent analysis of Model 4 predicting the SHR^3 without the U.S. in the model indicates the individualism still predicts the SHR^3 in the same direction, but the p-value is larger ($p = .24$).

study also advances the literature by explicating a *general* cultural value affecting attributional style utilizing research on the cultural conceptualization of self (Markus and Kitayama 1991). The results of this study suggest that social support (Cullen 1994) and social integration (Henry and Short 1954) should be integrated with Unnithan and colleagues' theoretical framework. Finally, multilevel regression techniques are used in this research in an attempt to reconcile disparate findings from researchers who tested the stream analogy within a single country (Lanier 2010; Wu 2004) and researchers who utilized international samples (Chon 2013; He et al. 2003; Unnithan et al. 1994; Unnithan and Whitt 1992).

The multilevel regression model used in this study provides results that only partially support the tenets of the stream analogy of lethal violence. Although the results confirm previous research and theory that the production of lethal violence is driven by some forms of social disorganization (divorce to marriage ratio) and changes in economic inequality within-nations over time, economic stressors are not significantly related to the LVR in these models. In fact, before controlling for social disorganization, the measure for economic stress (unemployment) was actually a statistically significant predictor of a lower LVR, the opposite of the hypothesized direction of the relationship (Model 2 in 'Table 3').

As for the direction of lethal violence (SHR), only partial support for Unnithan and colleagues' (1994) theory is provided by the multilevel regression results. Consistent with the theory, modernization directs lethal violence toward suicide and economic inequality and ethnic and linguistic heterogeneity direct lethal violence toward homicide. However, the

relationship between cultural measures and the SHR provide results that are inconsistent with the theory. The percentage of Catholics in a society is associated with an increase in the proportion of suicides to total lethal violence after the effects of religious homogeneity and population heterogeneity are controlled in the model. This is the opposite of previous bivariate research on the subject (Whitt et al. 1972) and contradictory to the theoretical premise that societies with a higher proportion of Catholics foster external attributions of blame while Protestant Christian cultures foster a greater amount of self-blame (Whitt 1994c). Also, the independent conceptualization of self approached statistical significance in the final model, but is definitely not one of the stronger predictors of the SHR (see Model 2 in 'Table 4'). Below, the production of lethal violence and direction of lethal violence are discussed separately in greater detail.

The Production of Lethal Violence (LVR)

Consistent with cross-national research on the stream analogy (He et al. 2003; Unnithan and Whitt 1992; Unnithan et al. 1994), this study indicates that higher levels of income inequality increase the rate of lethal violence within a society. However, the multilevel modeling procedure used in this research demonstrates that change in income inequality over time is a more salient factor than the total amount of income inequality across nations. Some of the previous studies on the production of lethal violence (Chon 2013; Lanier 2010) failed to find that economic inequality has an effect on the LVR. The results of this research suggest that one possibility for these inconsistent findings is that changes in income inequality over time may be more pertinent in predicting lethal violence than cross-

sectional comparisons between countries or between U.S. counties. However, the theoretical relationship between systemic frustration and lethal violence does not indicate that change in the amount of systemic frustration affects violence levels. Therefore, these results may be viewed as somewhat contradictory to the theory as between-country variation in the Gini index was not a significant predictor of the LVR.

The strongest predictor of lethal violence in this research is the divorce to marriage ratio. The results indicate that not only do countries with a higher proportion of divorces to marriages have higher rates of total lethal violence, but also that an increase in the proportion of divorces to marriages is associated with an increase in lethal violence. Consistent with previous research (He et al. 2003), this finding provides strong support for the hypothesis that certain types of social disorganization increase the amount of violence within a society.

Economic stressors are not significantly related to the LVR in the final model. This is inconsistent with theory and previous empirical findings (He et al. 2003). In fact, in the first two models, higher rates of unemployment are associated with lower levels of lethal violence. It is possible that these results are due to the inconsistent definitions of the unemployment rate between countries, as the within-country analysis of the unemployment rate simply failed to reach statistical significance, but never indicated that higher rates of unemployment are associated with a reduction of lethal violence.

Although there were some findings inconsistent with the theory, this study demonstrates avenues for future theoretical improvements. This research provides evidence that social support (Cullen 1994) is associated with a reduction in total lethal violence within

a society as the LVR is negatively associated with the mean percentage of GDP that is spent on social expenditures over the 16 year time period. Extant research and theory on the stream analogy has not considered the impact of 'buffers' against stress and strain. This research indicates that the most recent iteration of the stream analogy of lethal violence (Unnithan et al. 1994) should be revised to consider the impact not only of influences that increase stress and frustration, but also how social support can potentially reduce or buffer the amount of frustration and therefore, lethal violence in a society.

The Direction of Lethal Violence (SHR)

Unlike models predicting the LVR, the SHR^3 models produce a greater number of statistically significant findings. The findings of this research support Unnithan and colleagues' (1994) iteration of the stream analogy regarding the direction of lethal violence, but a few findings are problematic for the theory. Consistent with theory (Unnithan et al. 1994; Whitt 2010), modernization is associated with a higher proportion of suicides to total lethal violence while income inequality is negatively associated with the SHR. Also, as countries have more fractionalization along ethnic and linguistic lines, lethal violence is directed toward homicide, which is consistent with what Unnithan et al. (1994) posit near as a direction for future research in their treatise. For these measures, there is unambiguous support for Unnithan and colleagues' theory on the stream analogy.

However, the rest of the model predicting the SHR^3 is somewhat less supportive of the theory. First, the percentage of Catholic adherents within a country is a statistically significant predictor of a higher proportion of suicides to total lethal violence, the opposite of

the hypothesized direction (Whitt 1994c) and findings in previous research studying the impact of religious affiliation on the direction of violence (Whitt et al. 1972). This unexpected finding is difficult to interpret given that previous authors have proposed that Protestants, not Catholics, engage in a greater amount of self-blame (Whitt 1994c), which is inconsistent with these findings. Instead, the results are consistent with the notion that Catholics, not Protestants, engage in a greater amount of self-blame. When focusing on the role of social integration rather than culture, these results are consistent with Durkheim's (1966[1897]) contention that it is not just strong beliefs against suicide, but also social integration into the religious community that prevent suicide within Catholic countries. This research supports the idea that after controlling for religious integration and other structural factors, Catholic beliefs may actually direct lethal violence toward suicide. Overall, the results of this study give stronger support to Durkheim while casting doubt the contentions concerning religion and suicide made by Unnithan et al.

Some have suggested that the Catholic religion fosters a greater amount of guilt than Protestant Christian denominations (Sheldon 2006) and the results of the current study are consistent with the interpretation that Catholics harbor a greater amount of self-blame. However, without individual level data, it is impossible to determine whether it is actually Catholics or Protestants within these countries that are committing homicide or suicide at a higher rate (Van Poppel and Day 1996). Furthermore, contemporary religious practices and beliefs among Catholic affiliates in certain countries may be far removed from those adherents of earlier times. This religious affiliation measure may not capture the cultural (and

dogmatic) characteristics that have been found in the past to suppress suicidal behavior. Further research is needed to explicate whether these ecological data are actually representative of Catholics and Protestants in these countries as well as demonstrate whether "Catholic guilt" is a potential force directing lethal violence toward suicide.

Although the relationship between individualism and the SHR[3] approached statistical significance ($p = .103$, two tailed test) in the full model, the results of preliminary analyses indicate that the United States' high individualism score (91) and relatively low SHR (.57) may have undue influence on the relationship between individualism and the SHR, as the p-value of the relationship between individualism and the SHR increased to .24 without the U.S. in the model (see Footnote 12 and 14). Although these results are consistent with the hypothesis that the independent conceptualization of self directs lethal violence toward homicide, the lack of statistical significance between individualism and the SHR indicates that cultural attributions of blame are not one of the strongest predictors of the direction of lethal violence. Overall, these findings give limited support for the theoretical extension offered in this study.

It is possible that a more proximate measure of cultural differences in attributional style would provide stronger support for the extension of Unnithan and colleagues' (1994) claim offered in this research. Also, the individualism measure provided by Hofstede et al. (2010) is not representative of cultural values of the entire country, as the data were collected through a convenience sample of IBM employees. Although the relationship between individualism and the SHR did not reach statistical significance, it is possible that a better

measure which is representative of the people living within a country rather than just IBM employees would find stronger support for the link between individualism and the SHR. Further research is needed to improve cultural measures of cross-national differences in individualism.

Despite these inconsistent findings, this study demonstrates that measures of social integration may need to be integrated into Unnithan and colleagues' (1994) theoretical framework. The statistically significant relationship between religious integration and the direction of lethal violence provides more support for previous iterations of the stream analogy (Henry and Short 1954) than the Unnithan et al. (1994) model. Religious integration is associated with more homicides as a proportion of lethal violence, which is consistent with Henry and Short's (1954) hypothesis that social restraint causes individuals to see others as blame-worthy while lack of regulation and integration does not allow an individual to locate a legitimate external target to blame for frustration. These findings suggest that future research on the stream analogy should consider the impact of social integration on the direction of lethal violence and that Henry and Short's theoretical contributions need to be more closely examined to improve the updated theory on the stream analogy.

The current research was able to bridge the gap between analyses of cross-national variation in the SHR and cross-sectional studies of counties within the U.S. This study is the first research to date to examine the impact of ethnic/linguistic heterogeneity and the direction of lethal violence in the stream analogy of lethal violence. This cross-national study confirms Wu's (2003) findings that higher levels of racial segregation in U.S. counties direct

lethal violence toward homicide. However, because the indicator for ethnic/linguistic heterogeneity used in this study is not a time-varying measure, this research was not able to demonstrate how within-country influences over time differ from between countries influences on the direction of lethal violence.[15]

Limitations, Future Research, and Conclusion

A major limitation of this research is that the findings among these 31 nations are not representative of the other nations of the world. Further research on developing and lesser developed nations needs to be conducted to explicate whether some of the findings of this study are context specific. This research is also hampered by imprecise measures of unemployment. The OECD has begun to provide 'harmonized' rates of unemployment which control for the different operational definitions of unemployment that exist in OECD countries. However, the majority of these data were not compiled until 2009, which is outside the time frame of the current study. Finally, the limitations of cross-national mortality data on homicide make it impossible to determine sex-specific SHRs and LVRs as only the sex of the victim of homicide, not the sex of the assailant, is available in these data. It is a crucial part of testing this theory to determine whether cultural and structural influences have a different effect on the amount and direction of lethal violence for men and women (Batton and Ogle 2003; Vollum and Titterington 2001).

[15] The original intention of this research was to bridge the gap between research within the U.S. and research utilizing cross-national samples through the use of the multilevel regression model's ability to explicate the effect of variation both within and between countries. However, there were not statistically significant findings at level one of the SHR model which would indicate how the gap between literature on within-country and between-country samples can be bridged.

In conclusion, despite some findings inconsistent with the theoretically-derived hypotheses outlined in this research, this study demonstrates potential directions for future research on the stream analogy of violence that may help refine Unnithan and colleagues' theory explicated in *The Currents of Lethal Violence*. Specifically, future research on the stream analogy needs to examine how social support operates at multiple levels of analysis (Cullen 1994) to reduce rates of lethal violence. Also, religious integration appears to direct lethal violence toward homicide (Henry and Short 1954), demonstrating that future research and theoretical elaborations on the stream analogy of violence need to incorporate social integration into the portion of the theory predicting the direction of lethal violence. Finally, although the independent and interdependent conceptualization of self (Markus and Kitayama 1991) is not statistically significantly related to the direction of violence within this sample, this study provides a promising framework through which to investigate how cultural values direct lethal violence towards either homicide or suicide.

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Table 1
Homicide, Suicide, Lethal Violence Rate (LVR), Suicide-Homicide Ratio (SHR) and SHR^3 Means 1990 to 2005, by Country

Country	Homicide Rate	Suicide Rate	LVR	SHR	SHR^3
Australia	1.62	11.80	13.42	.88	.69
Austria	1.02	16.36	17.38	.94	.84
Belgium	1.72	16.56	18.28	.91	.75
Canada	1.66	11.51	13.17	.87	.67
Chile	3.90	7.85	11.75	.67	.30
Czech Republic	1.52	14.07	15.60	.90	.73
Denmark	1.09	13.29	17.38	.92	.78
Estonia	15.68	28.08	43.76	.65	.28
Finland	2.65	22.08	24.73	.89	.71
France	.88	15.68	16.57	.95	.85
Germany	.90	11.43	12.33	.93	.80
Greece	1.07	2.83	3.90	.73	.38
Hungary	2.72	25.45	29.17	.91	.75
Ireland	.84	11.05	11.89	.93	.80
Israel	2.69	6.52	9.22	.73	.44
Italy	1.47	5.88	7.36	.80	.52
Japan	.56	16.17	16.73	.97	.90
Mexico	15.58	3.66	19.24	.20	.01
New Zealand	1.68	13.15	14.83	.89	.70
Netherlands	1.17	8.39	9.56	.88	.68

Table 1 Continued

Country	**Homicide Rate**	**Suicide Rate**	**LVR**	**SHR**	**SHR[3]**
Norway	.98	11.69	12.67	.92	.79
Poland	2.18	13.57	15.74	.92	.64
Portugal	1.37	6.07	7.44	.81	.53
Slovakia	2.02	11.85	13.87	.85	.62
Slovenia	1.60	24.28	25.88	.94	.83
South Korea	1.64	13.78	15.43	.88	.69
Spain	.89	6.31	7.19	.88	.68
Sweden	1.11	11.95	13.06	.91	.76
Switzerland	1.11	15.81	16.92	.93	.82
United Kingdom	.75	6.65	7.39	.90	.74
United States of America	7.94	10.49	18.42	.57	.19
Total	**2.67**	**12.77**	**15.45**	**.84**	**.64**

Source: WHO 'Mortality Data base.' Homicide and suicide rates are age-standardized.

Table 2
Descriptive Statistics, 1990 to 2005

	Number of Observations	**Overall Mean**	**Overall Standard Deviation**	**Overall Range**
LVR	481	15.45	8.23	2.95, 66.54
SHR[3]	481	.64	.22	.00, .94
Individualism	496	60.92	20.26	18, 91
Gini	496	30.37	6.67	16.87, 52.22
GDP per capita	481	23638.28	8448.23	6913.58, 47626.28
Divorce to Marriage ratio	476	.38	.17	.05, 1.07
Unemployment rate	483	7.75	3.92	.60, 23.90
Fractionalization	496	.23	.17	.002, .64
Religious Homogeneity	476	.54	.35	.18, .93
Percent Catholic	476	.42	.35	.00, .96
Percent Protestant	476	.21	.28	.00, .90
Aggregate Social Expenditure	496	18.88	6.07	4.35, 29.92
Urbanization	496	74.37	10.59	50.58, 96.90
Valid N (Listwise)	**434**			

Table 3
Regression Coefficients from a Multilevel Model Examining the Impact of Predictors on the (Age-Standardized) Lethal Violence Rate in 31 OECD Nations, 1990 to 2005

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
L1 (within-country)					
GDP per capita	-.0002	-.0002	.0002	.0002	
	(.0005)	(.0005)	(.0004)	(.0004)	
Unemployment	.19	.16	.04	.04	-.10
	(.20)	(.21)	(.14)	(.14)	(.16)
Gini Index		.23	.31*	.31*	.48*
		(.20)	(.15)	(.15)	(.22)
Divorce to			24.01**	24.02**	23.90**
Marriage ratio			(8.72)	(9.13)	(9.12)
L2 (between-country)					
GDP per capita	-.0003	-.0004*	-.0003*	-.0002	
	(.0002)	(.0002)	(.0001)	(.0002)	
Unemployment	-.45†	-.63*	-.28	.10	.33
	(.26)	(.25)	(.30)	(.37)	(.29)
Urbanization	-.02	.0007	-.22†	-.19	-.20†
	(.12)	(.10)	(.12)	(.11)	(.11)
Gini Index		-.34*	.03	-.04	.06
		(.16)	(.23)	(.22)	(.22)
Divorce to			30.35**	34.33**	38.82**
Marriage ratio			(10.17)	(10.27)	(11.43)
Fractionalization			6.63	3.20	1.05
			(6.05)	(6.35)	(6.70)
Aggregate Social				-.37†	-.54**
Expenditures				(.19)	(.17)
Trajectory estimates					
Intercept	15.28**	15.27**	15.27**	15.27**	15.30**
	(1.21)	(1.15)	(.95)	(.91)	(.95)
Time	-.13	-.13	-.59**	-.59**	-.50**
	(.25)	(.24)	(.22)	(.22)	(.14)
Model fit					
Deviance (-2LL)	**2309.23**	**2300.15***	**2087.32****	**2084.89**	**2246.19***

Standard errors in parentheses. N=434 country-years nested in 31 countries. **p < .01, *p < .05, †p < .10 (two-tailed tests).

Table 4
Regression Coefficients from a Multilevel Model Examining the Impact of Predictors on the (Age-Standardized) Suicide-Homicide Ratio (cubed) in 31 OECD Nations, 1990 to 2005

	Model 1	**Model 2**	**Model 3**	**Model 4**
L1 (within-country)				
GDP per capita	.000005	.000005	.000005	.000005
	(.000005)	(.000005)	(.000005)	(.000005)
Gini Index	-.002	-.002	-.003	-.003
	(.004)	(.004)	(.004)	(.004)
L2 (between-country)				
GDP per capita	.000004	.000007†	.000007*	.000008*
	(.000004)	(.000004)	(.000003)	(.000003)
Gini Index	-.02**	-.02**	-.03**	-.02**
	(.005)	(.006)	(.005)	(.005)
Urbanization	-.0003	.002	.005*	.005*
	(.002)	(.003)	(.002)	(.002)
Individualism		-.001	-.002	-.002
		(.001)	(.001)	(.001)
Pct Catholic		.07	.18**	.23**
		(.09)	(.05)	(.06)
Pct Protestant		-.16	-.11	.003
		(.10)	(.08)	(.09)
Religious Homogeneity			-.25*	-.30**
			(.10)	(.08)
Fractionalization			-.42**	-.32*
			(.12)	(.11)
Americas				-.18
				(.14)
Trajectory estimates				
Intercept	.64**	.64**	.64**	.64**
	(.02)	(.02)	(.02)	(.02)
Time	.003	.0002	.0003	.0002
	(.0002)	(.003)	(.003)	(.003)
Model fit				
Deviance (-2LL)	**-1216.39**	**-1221.09**	**-1233.46****	**-1237.18†**

Standard errors in parentheses. N=434 country-years nested in 31 countries. **p < .01, *p < .05, †p < .10 (two-tailed tests).

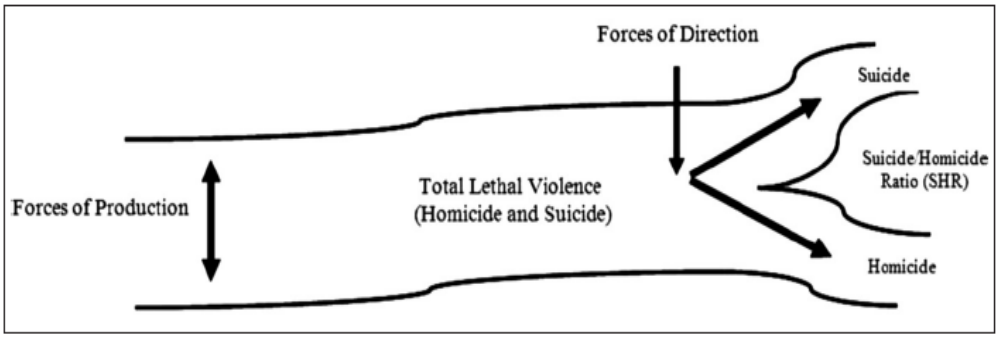

Figure 1. Visual Representation of the 'Stream Analogy'

Taken from: Lanier, Christina. 2010. "Structure, Culture, and Lethality: An Integrated Model Approach to American Indian Suicide and Homicide." *Homicide Studies* 14(1): 76.

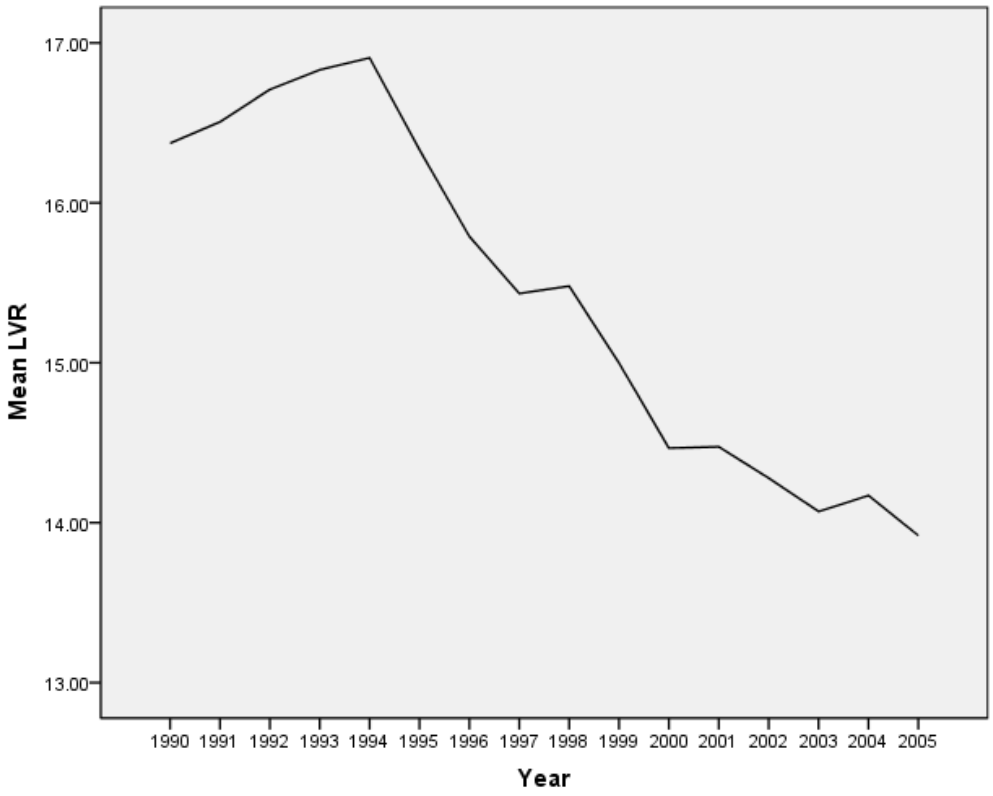

Figure 2. Mean (Age-Standardized) Lethal Violence Rate in 31 OECD Nations, 1990-2005

Source: WHO 'Mortality Data base.' Homicide and suicide rates are age-standardized.

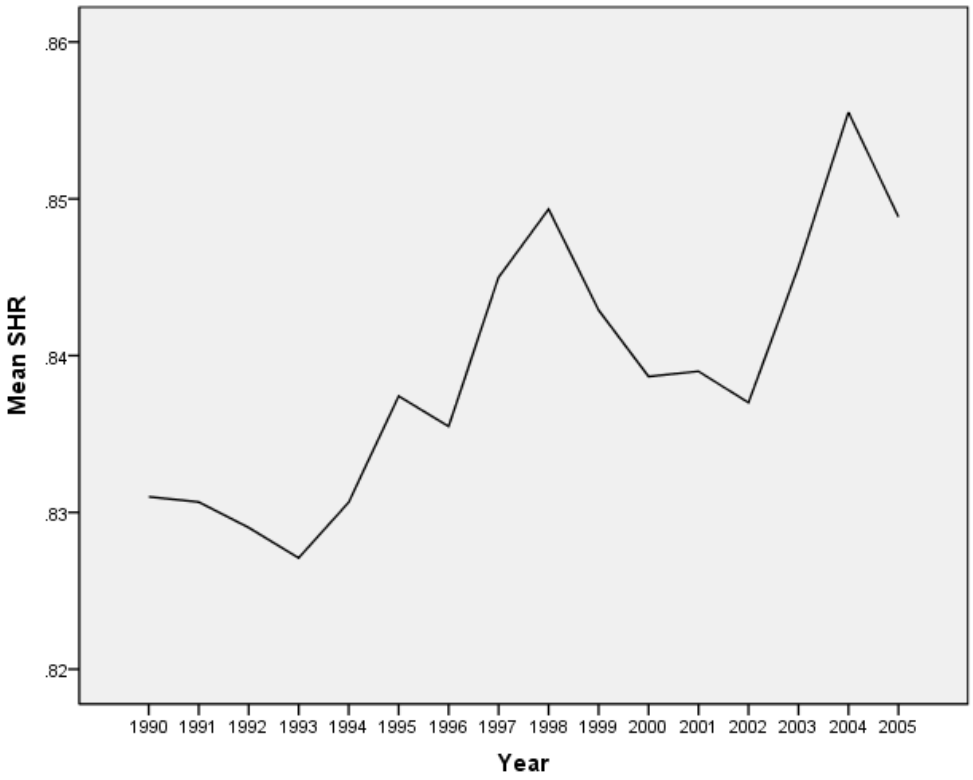

Figure 3. Mean (Age-Standardized) Suicide-Homicide Ratio in 31 OECD Nations, 1990-2005

Source: WHO 'Mortality Data base.' Homicide and suicide rates are age-standardized.

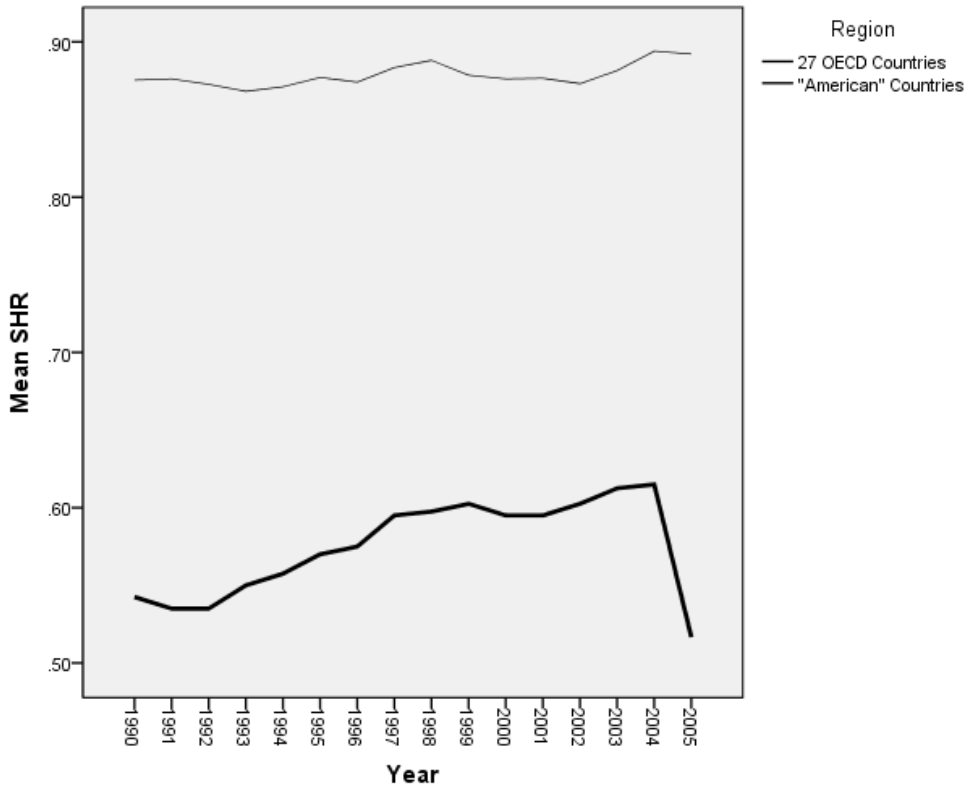

Figure 4. Mean (Age-Standardized) Suicide-Homicide Ratio in 31 OECD Nations: North, Central and South America and. 27 OECD nations, 1990-2005*

Source: WHO 'Mortality Data base.' Homicide and suicide rates are age-standardized. *The final year decline in the SHR for 'American' countries is due to missing data for Canada in 2005, not an actual decline in the SHR.

APPENDICES

APPENDIX A

Sample of OECD Countries

OECD Countries (N=31) and Number of Years Included in Analyses

Australia (15), Austria (16), Belgium (11), Canada (15), Chile (9), Czech Republic (11), Denmark (16), Estonia (11), Finland (16), France (16), Germany (15), Greece (16), Hungary (14), Ireland (6), Israel (15), Italy (14), Japan (16) Mexico (15), Netherlands (16), New Zealand (16), Norway (16), Poland (12), Portugal (14), Slovakia (11), Slovenia (11), South Korea (16), Spain (16), Sweden (16), Switzerland (16), the United Kingdom (16), the United States of America (16).

OECD Countries (N=3) Not Included in Analyses

Iceland, Luxembourg, and Turkey.

APPENDIX B

Data Sources

The dependent variables in this research were obtained from the WHO's 'Mortality Data base' that contains age-standardized homicide, suicide and automobile accident death rates at the country-level. These data can be obtained from the WHO at http://www.who.int/violence_injury_prevention/surveillance/databases/mortality/en/index.html.

Many of the economic indicators in this research were obtained from the World Bank (2013a, 2013b, 2013c). GDP per capita is measured in 2005 constant international dollars, controlling for inflation and purchasing power parity. This measure is located at: http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD. Unemployment percentage (as a percentage of the total labor force) is located at: http://data.worldbank.org/indicator/SL.UEM.TOTL.ZS/countries?page=5&display=default. Finally, the Gini coefficients used for comparative purposes to the Gini index used in this research can be obtained at: http://data.worldbank.org/indicator/SI.POV.GINI. The Gini index values used for this research was compiled by Solt (2009, 2013) in an attempt to reduce the amount of missing data in longitudinal studies using the Gini index. Utilizing data from various sources, but utilizing the Luxembourg Income Study as a standard for comparison, Solt used an algorithm to impute missing data on the Gini index. These data can be obtained at: http://thedata.harvard.edu/dvn/dv/fsolt/faces/study/StudyPage.xhtml?studyId=36908&versionNumber=10.

Crude marriage rates, crude divorce rates and percentage of the population living in urban areas were extracted from the UN *Demographic Yearbook* (1990-2010) (http://unstats.un.org/unsd/demographic/products/dyb/dyb2.htm) and the "World Urbanization Project" (http://esa.un.org/unup/CD-ROM/Urban-Rural-Population.htm),respectively. Seventeen cases of divorce and marriage data were supplemented from the OECD (2009) located at: http://www.oecd-ilibrary.org/sites/soc_glance-2008en/04/04/index.html?contentType=&itemId=/content/chapter/soc_glance-2008-8-en&containerItemId=/content/serial/19991290&accessItemIds=/content/book/soc_glance-2008-en&mimeType=text/htm. These data were supplemented to reduce missing cases on a key independent variable. The observations on cases where both data sets had complete cases were nearly identical and preliminary analyses indicate that the results of the substantive analysis were not altered by the inclusion of this data. Also, OECD (2013) were utilized for the amount of social expenditures as a percentage of GDP. The full cases were added and averaged out to the mean to represent a single data point representing the average amount of social expenditures spent during this 16 year time period. This data is located at: http://stats.oecd.org/Index.aspx?datasetcode=SOCX_AGG.

All data on religion were obtained from the Zeev and Henderson's (2013) 'World Religion Dataset: National Religion Dataset' located at: http://www.thearda.com/Archive/Files/Descriptions/WRDNATL.asp. To create the Herfindahl index for this study, the percentage of individuals adhering to each religion was squared and then added together. Then, this number was divided by the total percentage of people adhering to a religion

squared to control for rounding errors and the Japanese tendency to report two religions, making the number of religious adherents in their country over 100%. This formula produced a decimal number that represented the religious homogeneity of a nation.

Fractionalization data were derived from Alesina et al. (2003). These data represented heterogeneity of a population along ethnic, linguistic and religious lines. The ethnic and linguistic proportions were simply added and then divided by two for a unitary score of fractionalization. Individualism scores were obtained through Hofstede and colleagues' (2010) influential research that measures five cultural dimensions in 76 countries and regions. The data were collected by examining work preferences and practices in IBM companies across the world. The survey included questions on preferences concerning personal time, freedom to use your own style, challenge within the work that allows for a personal sense of accomplishment, the training opportunities offered, the physical working conditions and the full use of a worker's skills. In two cases, the data for one of the countries in the sample were given for two distinct regions a single country (Belgium and Switzerland). These two scores were simply added and then divided by two to produce a total mean score for the country as the overall age-standardized suicide and homicide data was not specific enough for regional comparison. Finally, the U.S., Canada, Mexico and Chile are coded as '1' to control for the observation of this region of countries tended to express lethal violence as homicide at a rate higher than other regions in the model.