Testing the Stream Analogy for Lethal Violence:
A Macro Study of Suicide and Homicide

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ABSTRACT

This study examines county-level suicide and homicide rates under the same theoretical perspective that treats both forms of lethal violence as alternative expressions. Results from the regression analysis confirm the conventional wisdom in that social deprivation is strongly associated with the level of violence. However, only moderate support was found regarding whether lethal violence will be expressed as either suicide or homicide. More significantly, region was found to interact with how violence is expressed. Southern counties tend to express lethal violence as homicide, but such a tendency is reversed by a higher percentage of college-educated residents. How violence is expressed in non-southern counties is influenced by two structural factors. Findings from this study were used to discuss the idea of a subculture of violence.

Every year in the United States, suicide and homicide both claim many lives. According to the Center for Disease Control and Prevention (CDC), in 1998 there were 30,575 deaths identified as suicide, which makes it the eighth leading cause of death nationwide. In the same year suicide was the third leading cause of death among people aged 15 to 24 years old. According to the Department of Justice (1998), in 1998 there were 16,914 homicides recorded by the police. Homicide is the second leading cause of death among people aged between 15 and 24 years old and the leading cause of death among black men of the same age group (CDC 1998). The human costs of both suicide and homicide are not only disheartening but also pose grave concern to both the public health and legal systems.

Both suicide and homicide are violent acts. The obvious difference is that the former directs violence toward oneself whereas the latter directs it toward others. The majority of previous studies on violence treat suicide and homicide as two independent phenomena (Lester 1994; Kaplan and Geling 1998). Very rarely do studies examine these two forms of violence under the same theoretical perspective and empirical framework. Furthermore, researchers in each area are often unaware of new developments in the other's field (Unnithan et al. 1994).

From a historical viewpoint, treating suicide and homicide as separate research subjects is a rather recent phenomenon. Henry and Short (1954) pointed out that there has been a long intellectual tradition in Europe to study these two forms of violence as a single phenomenon. For example, two nineteenth century Italian scholars, Enrico Morselli and Enrico Ferri, and

later the prominent Austrian psychiatrist Sigmund Freud all proposed to explain suicide and homicide as two sides of the same phenomenon. Their arguments focus on individuals' inner thought processes in committing either suicide or homicide. Freud,[1] for instance, argued that the suicidal impulse results from an individual's homicidal drive, induced by either an individual's sexual frustration or death instinct that turns toward oneself. Such an intellectual tradition, however, did not generate much scholarly interest among American sociologists before the end of the Second World War, partially because the influential French sociologist Emile Durkheim successfully refuted such an individualistic approach (Whitt 1994).

Examining 19th century European data, Durkheim (1897, 1951) argues that there seems to be an inverse relation between suicide and homicide rates, but such a correlation is not a constant. Instead, both rates tend to increase during economic recession and decline during tumultuous wartime. Had the individual-based argument been correct, as proposed by other European scholars, such a positive correlation would not have existed. Durkheim contended that social factors beyond individuals' control are the sources that contribute to the variation of both suicide and homicide rates.

Durkheim's study on suicide has inspired much sociological imagination regarding not just the origin of anti-social behaviors but also the nature and functioning of human society. While Durkheim was very specific on the causes and types of suicide, his writing on the causes and typology of homicide was vague at best.[2] His core concept in explaining suicide, anomie, can also be used to explain homicide in a society just as effectively. Therefore, Durkheim's ideas cannot distinguish specific

sources that cause either suicide or homicide. His significant influence, nevertheless, on the study of suicide and homicide is to lead sociologists to investigate suicide and homicide as separate events. Treating both forms of violent human expression as two seemingly unrelated events runs the risk of ignoring common fundamental social forces explaining both suicide and homicide. Such indifference will undermine a broader and deeper understanding of the causes of violence.

RECENT STUDIES EXAMINING BOTH SUICIDE AND HOMICIDE

Compared to a large body of research on suicide and homicide investigated separately, recent studies examining suicide and homicide are not common (See for example, Baller et al. 2001; Cutright and Fernquish 2000). Nevertheless, several studies have produced significant findings and substantive arguments. Using state-level data in 1980, David Lester (1994) documented patterns of suicide and homicide in the US. Lester found that suicide rates were strongly related with the level of interstate migration. Also, divorce rates and homicide rates were strongly related with the percentage of black residents in each state. From the same study, southern states registered higher homicide rates than the rest of the nation, whereas states in the northeastern region have the highest suicide rates in the US. Men have both higher suicide and homicide rates than women, and the degree of gender differential is contingent upon other socioeconomic factors such as church attendance, divorce rates, etc. Lester did not infer from these patterns of suicide and homicide in the US any theoretical argument concerning the intrinsic relation, or lack thereof, between these two forms of violence.

Using cross-national data, Pampel and Williamson (2001) found that change in suicide and homicide rates is contingent upon demographic structure, family change, and sociopolitical equality (also see Lee, 2001). Large age cohort exacerbates youth economic prospects but enhances the well being of elderly cohort, thus contributing to a higher youth lethal violence relative to the elderly's. Changes in work, marriage, divorce, and fertility may also increase youth lethal violence relative to that of the elderly. Finally, youth lethal violence is moderated through social institutions that emphasize on egalitarian distribution of scarce resources. Pampl and Williamson concluded that both suicide and homicide react to the above-mentioned social determinant in a similar fashion across nations.

After analyzing the correlation between the business cycle and suicide/homicide data, Henry and Short (1954:14) concluded that both types of violent behavior are "…aggressive acts which respond in a consistent way to objective frustrations generated by the flow of economic forces." Suicide is viewed as an aggressive behavior that targets oneself, whereas homicide targets others. They argued that "…suicide varies negatively and homicide positively with the strength of external restraint over behavior." (1954: 17) Essentially, Henry and Short's argument is an extension of a simplistic frustration-aggression thesis that owes its intellectual roots to European scholars such as Sigmund Freud. Their contribution to the understanding of a common source of suicide and homicide is that, much like Durkheim's argument, they pointed out that it is the relational system that determines the direction of aggression.

Historian Roger Lane (1979) attempted to explain three types of violent death in 19th century Philadelphia: suicide, murder, and accident. He observed that during the 19th century, the city of Philadelphia experienced a sizable increase in suicide rates around 1870 after a long period of stability. At the same time, accident rates in the city started to decline, and homicide rates decreased steadily and significantly. Lane attributed the simultaneous increase of suicide rates and decrease of both accident and homicide rates to the socialization/internalization process that was essential to an emerging industrial economy. The burgeoning factory-based economy in Philadelphia promoted a work environment and a public school system that "…put a premium on the ability to endure long stretches of frustration and boredom" (1979: 122). Outwardly impulsive behaviors were deemed as incompatible with work ethics required by the economic system and reinforced at public schools. Therefore, the relation among the three types of violent death is best understood as a product of a socialization process that took place during the industrial revolution in 19th century Philadelphia.

Perhaps the most significant development during recent decades in attempting to explain both suicide and homicide as two sides of the same phenomenon is the stream analogy argument proposed by Unnithan et al. (1994). Influenced by early European scholars (see Whitt 1994), they argue that suicide and homicide are "…two alternative channels in a single stream of lethal violence." Further, they contend that suicide and homicide rates are a function of two sets of causal mechanisms: forces of production and forces of direction. Forces of production refer to social and cultural factors that are responsible for the total amount of lethal violence, as expressed in either suicide or homicide. Forces of direction refer to cultural and structural factors that prompt members of society to direct their violent drives to either suicide or homicide. A higher tendency of external blame will result in a higher homicide rate relative to suicide rate. Conversely, factors that increase the likelihood of

internal attribution of blame increase the risk of suicide relative to homicide.

The stream analogy proposed by Unnithan et al. was recently tested by Batton's trend study (1999) in which nationwide homicide and suicide data for most of the twentieth century were examined. Batton found that rates of alcohol consumption, immigration, and divorce were related to external attribution of blame that resulted in a higher tendency for violence to be expressed as homicide. Although Batton also mentioned other factors, such as economic deprivation, that were related to either forces of production or direction, the empirical evidence cited in her study is not consistent enough to draw a conclusion. Batton concluded that the stream analogy proposed by Unnithan et al. was useful in explaining historical trends in violence expressed as either suicide or homicide.

The stream analogy proposed by Unnithan et al. and tested by Batton leaves several theoretical and empirical issues unanswered. First, the difference between force of production and force of direction is clear conceptually, but it assumes that both suicide and homicide result from the same destructive social forces. Lethal violence, as expressed in either suicide or homicide, is a theoretical construct that may possibly include other types of violent behaviors or events. As Lane pointed out, accident rates[3] in the city of Philadelphia during the 19th century were intrinsically related to a fundamental social change that also affected both suicide and homicide rates. Thus, the construct that includes suicide and homicide may be broader than lethal violence. Second, the distinction between force of production and force of direction is not as clear empirically as claimed. Take economic deprivation as an example. It was treated as a variable measuring force of direction in Batton's study. However, it was treated as force of production in Whitt's study that is part of the endeavor to develop the integrated model proposed by Unnithan et al. The difference between these two studies in how economic deprivation is used further illustrates the conceptual ambiguity between forces of production and direction. Third, measurement of force of direction is problematic. Batton's approach in determining which specific factor accounts for the forces of direction is problematic in that no predetermined criteria or model were set to evaluate factors in her analysis. The researcher's subjective interpretation determines which factors become the forces of production and which factors become forces of direction. The attempt of Corzine et al. in testing the force of direction is an interesting yet unsatisfactory one. They used an unmeasured concept of southern culture in their study to test whether the percentage of a state's population born in the south can explain the force of direction. The results are not conclusive, besides other methodological problems in their study.

The main problem lies in their unexamined assumption that southern culture, assumed to be the force of direction, channels violent drive toward homicide.

The purpose of this study is to test the stream analogy proposed by Unnithan et al. by using more comprehensive cross-sectional data, which is lacking in previous studies. Specifically, this study will use county-level data to test whether forces of production explain volume of lethal violence and whether forces of direction explain type of lethal violence. Further, unlike some previous studies both independent and dependent variables will be selected based upon theoretical grounds and review of related literature.

METHODOLOGY
Data

Suicide and homicide data were obtained from the Multiple Cause of Death study conducted by the National Center for Health Statistics (NCHS).[4] A three-year (1989-1991) average suicide rate and a three-year average homicide rate are used in this study to minimize any possible single-year random fluctuation for all dependent variables. Only counties with populations larger than 100,000 persons in the 1990 census were included in this study, because smaller counties often do not have enough or any suicide and/or homicide data for a meaningful comparison.[5] NCHS data also include legal interventions (deaths due to police shootings and executions) as part of homicide counts. These cases were excluded from all homicide counts in this study, because such deaths conceptually do not fall into the category of violence according to the literature discussed above. Beside the NCHS data, this study will use data from the vital statistics and census data to adequately test the stream analogy.

Measurement

Suicide and Homicide rates: Age standardized suicide rate (ASR) will be used in this study, and it is defined as follows:

$$D_{ij} / P_{ij} = S_{ij} \text{ , and} \qquad (1)$$
$$\Sigma \, S_{ij} * P_i^s = ASR_j \qquad (2)$$

Where, D_{ij} are suicide deaths for age group (five-year age intervals) i and residents of county j, P_{ij} is the total population of age group i in county j, so S_{ij} is the age-specific suicide rate for age group i in county j. P_i^s represents the proportion of people in that age group in the standard population (Phillips 1997; also see Smith and Zahn 1999). Age standardized homicide rate (AHR) will be calculated in the same fashion as the one for suicide.

In this study, two dependent variables are used: a lethal violence rate and a suicide/homicide ratio variable, both proposed and tested by previous

researchers (see for example Gold 1958; Unnithan et al. 1994). Lethal violence rate refers to the combination of suicide and homicide rates in a county. The suicide/homicide ratio variable is obtained by dividing the suicide rate by the sum of the suicide and homicide rate. What this variable measures is the proportion in which lethal violence will be expressed, either as suicide or homicide. A higher suicide/homicide ratio reflects the higher tendency that lethal violence will be manifested as suicide, and vice versa.

Force of production is measured by the following county-level social indicators of social deprivation: poverty, Gini index, teenage women with own children, unemployment rate, infant mortality rate, and percentage of non-white residents.

Absolute and relative deprivation reflects structural inequality that has been linked to the increase of crime and other social ills (see for example Currie 1985). Absolute and relative deprivation may also reflect the degree of social disorganization in a community that generates deviant behaviors, including both suicide and homicide (Stark 1987; Goode 1996). In this study, the percentage of households living below poverty line in a county is used to measure absolute deprivation. Relative deprivation will be measured by a Gini coefficient that reflects the extent of income inequality in a community. The Gini coefficient is computed by the following formula:

$$\sum_{i=1}^{n} 2 (X_i - Y_i) \Delta X_i \qquad (3)$$

Where, $X_i = 1/N$, Y_i = cumulative percentage of income by census tract, and $\Delta X_i = X_i - X_{i-1}$

Previous studies have shown that percentage of teen mother in a community is associated with a higher degree of normlessness and deprivation (Wilson 1996). This study will include this variable as one indicator of forces of production.

Jobs impose discipline and regularity for individuals and subsequently maintain community stability (Wilson 1996). The degree of social disorder and deprivation will rise when jobs disappear. This study will use unemployment rate to measure economic deprivation.

Infant mortality rate is closely linked to economic inequality. A higher degree of infant mortality rate also shows a higher tendency of experiencing traumatic and negative life events, which is what Unnithan et al. (1994) defined as an element of forces of production.

Previous studies have shown that percentage of non-white residents is strongly associated with poverty rate and other social deprivation indicators. This variable will be included to measure forces of production as it covers the racial dimension of social deprivation.

Force of direction is measured by the following county-level social indicators of attribution: the percentage of immigrants, racial segregation, divorce rate, the percentage of college educated residents, and the percentage of professional work force.

Immigration can pose a threat to receiving communities in several aspects including threat to job security, community norms and values, as well as political power structure. Therefore, a higher level of immigration is associated with a stronger tendency to direct aggression toward others. In this study, the level of immigration is measured by the percentage of county residents who are immigrants.

Racial residential segregation is found to generate racial antagonism in which different racial and ethnic groups hold hostile views toward one another (see for example Massey and Denton 1993). Racial antagonism also fosters a group sentiment in which others are to be blamed for one's misfortune (Henry and Short 1954; Unnithan et al. 1994). It is reasonable to suggest that a higher degree of racial residential segregation is associated with a stronger tendency to direct aggression toward others, i.e., a lower coefficient in the suicide/homicide ratio variable. The index (D) of racial residential segregation (the index of dissimilarity) is computed by the following formula:

$$D = 100 \left(\tfrac{1}{2} \sum_{i=1}^{k} | X_i - Y_i | \right) \qquad (4)$$

Where, X_i = the percentage of the white population living in a given census tract in the research county;
Y_i = the percentage of the non-white population living in a given census tract in the research county;
k = the number of census tracts in the area.

Batton's (1999) test of the stream analogy initially used divorce rate as a measure of force of production, but found that divorce rate also functioned as force of direction in her analysis. Batton concluded that a higher divorce rate can be associated with a higher degree of self-blame, i.e., internal attribution, thus a higher suicide/homicide ratio.

According to the reviewed literature, work and education are two primary institutions where the socialization process channels frustration into either suicide or homicide. The following county-level measures of socialization are included to test this hypothesis: percentage of county residents who are college educated and percentage of county residents who are professional workers. A higher percentage of college-educated residents and professional workers is associated with a higher degree of internal attribution.

Finally, county population and region will be treated as two control variables. Specifically, the natural log transformation of county population will be used instead of the actual size in the county population which has a

Table 1. Correlations, Means, and Standard Deviations of Dependent, Independent, and Control Variables.

	1	2	3	4	5	6	7	8	9	10
1. Homicide rate[a]	1.00									
2. Suicide rate[a]	.245**	1.00								
3. Lethal violence rate	.898**	.646**	1.00							
4. Suicide homicide ratio	-.828**	.029	-.639**	1.00						
5. Poverty rate	.534**	.093*	.463**	-.559**	1.00					
6. Teen Fem w/ children	-.028	.154**	.047	0.71	.257**	1.00				
7. Gini index	.446**	.105*	.398**	-.477**	.536**	-.087	1.00			
8. Infant mortality rate	.587**	.087	.502**	-.584**	.399**	.035	.277**	1.00		
9. Nonwhite population	.740**	-.017	.575**	-.791**	.543**	-.030	.417**	.538**	1.00	
10. Unemployment rate	.409**	.099*	.367**	-.403**	.814**	.247**	.390**	.261**	.363**	1.00
11. Immigrant residents	.181**	-.120*	.088	-.296**	.165**	-.209**	.242**	-.116*	.370**	.219**
12. Racial segregation	.406**	.119*	.374**	-.399**	.172**	-.294**	.297**	.296**	.238**	.202**
13. Divorce rate	.116*	.243**	.201**	-.110*	.078	.290**	.087	.121**	.068	.019
14. College-ed residents	-.039	.068	-.062	.045	-.392**	-.154**	.071	-.171**	.045	-.482**
15. Professional workers	.284**	.023	.234**	-.252**	-.026	-.106*	.101*	.185**	.291**	-.048
16. County population[b]	.326**	.058	.283**	-.328**	.054	-.185**	.196**	.083	.293**	.092*
17. Region	-.324**	-.043	-.275**	.433**	-.275**	.060	-.193**	-.292**	-.374**	.019
Mean	6.92	11.23	18.15	.67	8.75	7.90	.42	9.58	16.49	6.02
Standard deviation	7.16	4.12	9.09	.16	4.71	2.96	.04	2.73	13.62	2.04

* $p < .05$, ** $p < .01$

[a] Both homicide and suicide rates are not analyzed in this study, instead it is the lethal violence rate and the suicide homicide ratio that are the dependent variables. It is natural that both suicide and homicide rates are highly correlated with lethal violence rate.

[b] Natural log of county population.

Table 1. Continued.

	11	12	13	14	15	16	17
11. Immigrant residents	1.00						
12. Racial segregation	.037	1.00					
13. Divorce rate	-.095*	-.091	1.00				
14. College-ed residents	.248**	-.130**	-.050	1.00			
15. Professional workers	.145**	.127**	-.034	.375**	1.00		
16. County population[b]	.490**	.286**	-.061	.153**	.109*	1.00	
17. Region	.100*	-.008	-.247**	.008	-.106*	.086	1.00
Mean	5.70	.52	4.73	21.06	20.46	12.47	.35
Standard deviation	6.15	.15	1.70	7.66	4.49	.79	.48

positively skewed distribution. A south-non-south[6] dichotomized variable will be used to measure region.

Statistics

In addition to describing the results, ordinary least square (OLS) regression will be employed in the data analysis because all variables used in this study are interval in nature (Agresti and Finlay 1986). In any ecological study such as the present one, multicollinearity will become a problem for the analysis, as many variables will be highly correlated. Procedures recommended by researchers with expertise in dealing with the multicollinearity problems will be followed (see for example Allison 1999; Chatterjee and Price 1991). Specifically, the variance inflation factor (VIF) coefficient will be used to select variables to be included in the regression analysis. Any variable that generates a VIF coefficient higher than 2.5 will be excluded from the model (Allison 1999).

FINDINGS

Means, standard deviations, and correlation matrix for all variables are presented in Table 1. It is clear that some independent and control variables are much more strongly associated with both lethal violence and suicide/homicide ratio than others. For example, poverty rate is positively and strongly associated with lethal violence, but negatively associated with the suicide/homicide ratio variable. Region, measured as south vs. non-south, shows just the opposite pattern with both lethal violence and suicide/homicide ratio variable. Results from the bi-variate analysis are interesting but do not directly address the main concern of this study.

Table 2 displays regression results from the first model that estimates the impact of various indicators of force of production on lethal violence. Overall, all indicators of force of production are positively related to the volume of lethal violence, a combined product of suicide and homicide rates. Among the independent variables, infant mortality rate is the strongest predictor; counties that have higher infant mortality rates tend to have higher levels of lethal violence. In the model including both independent and control variables, it is the natural log of county population, treated as a control variable, that has the strongest impact on volume of lethal violence. Larger counties tend to have a higher level of lethal violence. The model[7] explains 50.9 percent of the variance in the dependent variable. In essence, the model derived from the stream analogy is supported by the regression results in that the sheer volume of lethal violence is explained by various indicators of force of production.[8]

Table 2. OLS Regression Analysis of Force of Production on Lethal Violence Rate.

Variable	B	Beta
Teen women with own children	.153 (.047)	.117***
Unemployment rates	.694 (.177)	.156***
Gini index	19.527 (8.109)	.094*
Infant mortality rates	.849 (.133)	.254***
Percentage Non-white	.113 (.032)	.169***
South (south =1)	3.080 (.734)	.161***
County Population[a]	3.888 (.443)	.339***
Constant	-62.652 (7.229)	
R-square	.509	
F value	66.581***	
	N= 458	

[a] Natural log transformation
* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed tests)

Table 3 shows regression results that tests the stream analogy model that emphasizes the impact of force of direction, which is responsible for whether lethal violence will be expressed as either suicide or homicide. The model explains 76 percent of the variance in the dependent variable: suicide/homicide ratio. The strongest predictor is the percentage of non-white residents in a county: counties that have higher percentage of non-white residents tend to have a lower suicide and homicide ratio. In other words, counties that have higher non-white residents tend to express lethal violence in the form of homicide. Other characteristics of counties that express lethal violence as homicide include: higher unemployment rates, higher degree of income inequality, southern counties, larger counties, and higher degree of racial segregation.

Of the five indicators conceptualized as measures of force of direction, only the degree of racial segregation was found to have a moderate impact on suicide/homicide ratio. More significantly, the direction of correlation is consistent with what the stream analogy predicts. Counties that have a higher level of racial segregation, i.e. a higher degree of racial antagonism, tend to express lethal violence as homicide.

The strong and significant impact of the region variable, coded as south-vs-non-south, on the suicide/homicide ratio variable suggests that region may have an interactive effect. To examine the interactive effect, separate regression analysis was conducted for southern and non-southern counties. Table 4 displays the results of regression analysis employing indicators

Table 3. OLS Regression Analysis of Force of Direction on Suicide-Homicide Ratio Variable.

Variable	B	Beta
Teen women with own children	-.001 (.068)	-.015
Unemployment rate	-.838 (.289)	-.105***
Gini index	-27.070 (10.924)	-.073*
Infant mortality rate	-1.068 (.188)	-.179***
Percentage Non-white	-.514 (.044)	-.430***
South (south =1)	-7.547 (.965)	-.220***
County Population[a]	-3.195 (.672)	-.156***
Percentage Immigrants	-.173 (.089)	-.066
Segregation Index	-14.391 (3.300)	-.131***
Divorce Rate	-.219 (.245)	-.023
Professional work force	-.002 (.098)	-.021
Percentage college-educated	.001 (0.74)	.036
Constant	156.216 (9.525)	
R-square	.760	
F value	117.330*** N=458	

[a] Natural log transformation
* p< .05, ** p< .01,*** p< .001 (two-tailed tests)

of force of production and direction[9] by region. Table 4 shows that both R-square for southern and non-southern counties increase, which indicate that the dependent variable is better explained when region is held constant in the analysis. Results in Table 4 also demonstrate that in southern counties it is the percentage of college-educated residents, among indicators of force of direction that has the only significant impact on the suicide/homicide ratio variable. Southern counties that have higher percentage of college-educated residents tend to have a higher tendency to express lethal violence in the form of suicide. This finding is consistent with the stream analogy. Among non-southern counties, two indicators of force of direction were found to have significant impact on suicide/homicide ratio. Index of segregation is associated with a higher tendency of expressing lethal violence in the form of homicide, and so is the percentage of immigrants in the counties.

Counties that have a higher degree of segregation and immigration tend to express lethal violence as homicide. This finding is also consistent with the stream analogy.

DISCUSSION AND CONCLUSION

This study is limited by the analysis of only large counties in the US. Specifically, only counties larger than 100,000 persons in the 1990's census were included in the analysis. Therefore, findings from this study cannot be inferred to the entire United States, which includes many smaller counties. This study is also limited by measurement of cultural variables at the county level. Many cultural variables, such as membership of fundamentalist churches that was shown to affect the direction of attribution, are not available at the county level (Grasmick and McGill 1994). Inclusion of these cultural variables may shed new light on what specific cultural components constitute forces of direction.

Despite these above-mentioned limitations, results from the regression analysis support the notion that forces of production explain the volume of lethal violence. However, regression results in this study show moderate support for the most critical aspects of the stream analogy in that there is weak evidence to show that only one indicator of forces of direction, racial segregation, explains whether violence will be expressed as suicide or homicide. Further, according to the stream analogy proposed by Unnithan et al., forces of direction refers to both cultural and structural factors that are responsible for whether lethal violence will be expressed as either homicide or suicide. No cultural indicator of the force of direction was found to have a significant impact on how violence is expressed.

Among all indicators of forces of production, infant mortality rate has the most impact on lethal violence; counties with a higher infant mortality rate are more likely to have a higher level of lethal violence. In other words, a community's susceptibility to murder and suicide is strongly linked to its inability to prevent infant mortality, which is a result of poverty (Gortmaker 1979; also see Saegert et al. 2001). This finding points to a clear direction for public policy on violence prevention. Despite recent efforts on the part of some public health officials, researchers, and community activists (Centers for Disease Control and Prevention 1994; Curtis 1998; Oliver 2000), the nation's policy toward homicide in particular and crime in general emphasizes a solution through the criminal justice system. That is, homicide is treated narrowly as a crime issue. Policy makers in the US need to readjust violence prevention strategies toward incorporating measures that simultaneously address the issue of alleviating poverty, which is directly linked to infant mortality, suicide, and homicide in a community.

Table 4. OLS Regression Analysis of Force of Direction on Suicide-Homicide Ratio Variable: Southern vs. Non-southern Counties.

Variable	South		Non-South	
	B	Beta	B	Beta
Teen women with own children	.233 (.148)	.080	-.161 (.073)	-.084*
Gini index	-76.744 (20.355)	-.223***	-33.265 (11.866)	-.098**
Infant mortality rate	-.403 (.288)	-.087***	-1.359 (.249)	-.213***
Percentage Non-white	-.675 (.069)	-.662***	-.456 (.065)	-.365***
County Population[a]	-3.938 (1.158)	-.202***	-3.222 (.825)	-.177***
Percentage Immigrants	-.003 (.137)	-.028	-.330 (.121)	-.139***
Segregation Index	11.772 (6.865)	.110	-22.305 (3.873)	-.233***
Divorce Rate	-.309 (.361)	-.040	-.258 (.333)	-.027
Professional work force	.002 (.158)	.002	-.186 (.125)	-.052
Percentage college educated	.288 (.092)	.169**	.137 (.080)	.067
Constant	135.742 (16.836))		169.414 (11.577)	11.577
R-square[b]	.851		.848	
F value	38.548***		73.693***	
	N = 158		N = 300	

[a] Natural log transformation

[b] Unemployment rate was excluded from the model due to a multicollinearity problem.

* p< .05, ** p< .01, *** p< .001 (two-tailed tests)

Findings in this study show that region has an interesting impact on how lethal violence is expressed. When separate regression analysis was performed, the results indicate that in southern counties one indicator of forces of direction, the percentage of college-educated residents, was positively correlated with the suicide/homicide ratio variable. Southern counties that have a higher percentage of college-educated residents tend to express lethal violence as suicide. This finding is consistent with the stream analogy in that education serves as a mechanism in which aggression/frustration is suppressed to foster self-autonomy, which is essential in modern higher educational environment. No such pattern was found among non-southern counties where two structural indicators of force of direction were found to affect how violence is expressed. Region apparently interacts with forces of direction, which accounts for whether violence will be channeled into suicide or homicide.

That there exists a southern subculture of violence is not a new idea (Corzine et al. 1999). This concept has been applied to explain higher levels of homicide in the southern region. Table 2 shows that southern counties have a higher level of lethal violence and Table 3 shows those southern counties tend to express lethal violence as homicide compared to non-southern counties. The only exception to this pattern is that southern counties that have a higher percentage of college-educated residents tend to express lethal violence as suicide as opposed to homicide. The following explanation of this particular finding is offered. College education serves as a secular force that neutralizes a subculture of violence, which was found to be associated with high homicide rates in the south (see Corzine et al. 1999). As a result, norms in southern counties with a higher percentage of college educated residents are less likely influenced by a subculture that endorses violence as a way to resolve interpersonal conflict than they are influenced by pragmatic training in higher education that emphasizes self-autonomy. In other words, a southern subculture of violence is being mitigated by a higher level of education, only to have such violent tendencies be expressed in the form of suicide. It is also reasonable to argue that lacking a subculture of violence, it is two

structural factors, the degree of immigration and racial segregation, that are significantly related to the suicide/homicide ratio variable in non-southern counties.

The results of this study indicate that both suicide and homicide may share more similar social causes than previously conceived. Human violence, broadly conceptualized, is rooted in structural and cultural factors that generate the sheer volume of violence (Pampel and Williamson 2001; Singh and Unnithan 1999). The results of this study also suggest that whether human violence will be expressed in the form of suicide or homicide is predicated upon both cultural and structural factors as the stream analogy contends. Findings from this study thus reveal a need for future study that examines both suicide and homicide under the same theoretical and empirical framework. Specifically, more work is needed to clarify the distinction between forces of production and forces of direction conceptually. It may be fruitful to specify forces of direction as cultural factors, such as what Messner and Rosenfeld (2001) suggested in their work on crime and the American Dream. It is about how a community, large or small, justifies its actions, in this case whether suicide or homicide is a chosen solution to resolve interpersonal conflicts and frustration. Specifically, Messner and Rosenfeld argue that a cluster of uniquely American values, such as the notion of individualistic achievement and "fetishism of money," heightens the anomic pressure that subsequently raises the severity and extent of crime problems in American society. If the forces of direction are about components of a culture in each community, then researchers can isolate specific cultural contents among different levels of analysis to account for why certain communities/states/countries tend to express lethal violence in the form of either suicide or homicide. Also, empirical tests should be conducted to validate such a conceptual distinction. A structural equation model holds great potential for distinguishing these two latent variables. Finally, besides using cross-sectional data, future studies should also employ a longitudinal design that can answer the research question from a historical viewpoint (See for example, Batton 1999; Vollum and Titterington 2001). Overall, the stream analogy is a promising theoretical framework to study human violence, although more work is needed to refine its core concepts and measurements.

NOTES

[1] See Unnithan et al. (1994) for a detailed discussion of the European intellectual endeavor of treating both suicide and homicide as a same phenomenon.

[2] Critics of the anomie perspective such as Messner and Rosenfeld (2001) argued that the concept of anomie cannot fully account for the high volume of homicide, especially high rate of gun related homicide in the US as compared to other industrialized societies. Nor can the anomie theory fully explain more specific type of homicide, such as intimate homicide.

[3] Accidents were not analyzed in this study, because that is not how lethal violence was conceptualized by Unnithan et al. and tested by the author in this paper.

[4] For a detailed discussion regarding various sources of homicide data, see Riedel (1999).

[5] This is especially crucial when calculating the suicide/homicide ratio variable with a zero suicide and/or homicide count.

[6] Southern counties are from the following states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

[7] Poverty (VIF = 5.45) was excluded from the regression analysis because of a multicollinearity problem.

[8] A negative binomial regression was also applied to the same data set because of over-dispersion in the lethal violent rates among 458 large counties. All but one indicator, the percentage of non-white residents, of forces of production were significant predictors of lethal violence rate. The level of significance of percentage non-white is .07, very near the .05 threshold. In other words, the negative binomial regression technique produces very similar outcomes as the OLS results. Results of the negative binomial regression are available upon request.

[9] Unemployment rate (VIF = 4.97) was excluded from the regression analysis because of a multicollinearity problem.

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