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Feature Articles

Is Emerging Adulthood Influencing Moffitt's Developmental Taxonomy? Adding the "Prolonged" Adolescent Offender

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Abstract: *The study of offender trajectories has been a prolific area of criminological research. However, few studies have incorporated the influence of emerging adulthood, a recently identified stage of the life course, on offending trajectories. The present study addressed this shortcoming by introducing the "prolonged adolescent" offender, a low-level offender between the ages of 18 and 25 that has failed to successfully transition into adult social roles. A theoretical background based in prior research in life-course criminology and emerging adulthood is presented. Using data from the National Longitudinal Study of Adolescent Health analyses examined the relationship between indicators of traditional turning points and social bonds and low-level criminal offending and drug use. Several indicators including education, economic instability, and parental attachment were all predictive of offending and drug use.*

Keywords: Emerging Adulthood, prolonged adolescent offender, crime, drug use, and life-course criminology

INTRODUCTION

The journey to adulthood has drastically changed in the United States and other developed nations over the last 50 years (Cote 2000). Social scientists have noted the extension of the period between adolescence and adulthood; traditional markers of adulthood, such as marriage have been postponed resulting in delayed transitions to adulthood (Arnett 1998; Cote 2000). This prolonged stage of the life course has been identified as emerging adulthood (Arnett 1998). This period typically lasts from about age 18 to 25; although for many it can extend through the twenties and thirties. Many in emerging adulthood have high rates of risky and delinquent behaviors usually seen in adolescence. They have the potential to inundate jails and courts, further straining the already limited resources of the criminal justice system. It is argued here that this new stage of the life course may be influencing offending trajectories and extending the period of active offending for some

low-level offenders, hereafter referred to as "prolonged" adolescent offenders. The prolonged adolescent offender is defined as a low-level criminal offender (defined here as an offender who participates in less serious, non-violent crimes such as shoplifting), between the ages of 18 and 25 that has failed to transition to adult social roles that inhibit deviance and increase social bonds. As a result, prolonged adolescent offenders continue to commit low-level offenses (e.g., vandalism, being loud and rowdy in a public place) typically seen in adolescents.

Research dealing with emerging adulthood has focused mainly on risky behaviors such as reckless driving and substance use (Arnett 1998; Arnett 2005; Chassin, Pitts, and Prost, 2002; White, Labouvie, and Papadaratsakis 2005). Up to this point, there has been only a limited examination of crime during emergent adulthood (Markowitz and Salvatore 2012; Piquero, Brame, Mazerolle, and Haapanen 2002). The present study addresses this limitation by directly incorporating emerging adulthood into criminology, providing an examination of how emerging adulthood may be altering offending for some young adults. While prior studies have suggested that the 'maturity gap' identified by Moffitt (1993) may lead to longer periods of offending for some youth offenders, this study attempts to directly tie the influence of emerging adulthood to offending and to lay the foundation for further studies that may explore the influence of emerging adulthood on crime.

As the term "prolonged adolescent" implies, persons in this category have failed to make *on-time* transitions, normatively defined (relative to social norms) as transitions made at an age considered appropriate (relative to social norms), or meet turning points in trajectories that mark the entrance into adulthood (Laub and Sampson 2003; Thornberry 1997). For the first half of the twentieth century in the United States and other high income nations, transitions included going to college, getting a job, marrying, and having a family occurred during the late teens and early twenties (Arnett 2000; Cote 2000). However, in the last 50 years, changes in industrialized nations, including the decline of well-paying manufacturing jobs, an increase in low-paying service positions, a shift to a credential-based employment market, and a rise in the number of people earning post-secondary education, have all contributed to the delay in the timing of many traditional turning points (Cote and Allahar 1995). Those who make these transitions between the ages of 18-25 are considered *on time* (Elder 1985), and those who made either precocious or delayed transitions between the ages of 18 and 25 are considered *off time* (relative to social norms) (Thornberry 1997). Those who make *on time* transitions meet normatively defined turning points symbolizing successful entry into adulthood.

This article has 2 main goals: (1) to describe and identify, the prolonged adolescent offender in the context of the emerging adulthood phase of the life course, as well as being an addition to Moffitt's (1993) existing taxonomy, and (2) to explore the influence of traditional turning points and social bonds on offending behaviors of a sample of emerging adults.

Crime, Deviance and Emerging Adulthood

The key to understanding prolonged adolescent offenders is to understand the factors that influence and motivate their offending. Emergent adults are not subjected to the same levels of formal and informal social controls faced by adolescents, and without the informal social controls and attachments built through marriage, family, and employment, those in emerging adulthood have fewer social bonds to inhibit risky, deviant, and criminal behaviors (Salvatore and Taniguchi 2012). The motivation most often found for various forms of risky behavior that emerging adults engage in is sensation seeking, the need for new and intense sensory experiences, which many emerging adults consider a part of their identity exploration (Arnett 1994; Gottfredson and Hirschi 1990). Since emerging adulthood is a relatively new phenomenon there has only been limited research exploring the relationship between crime and this new stage of the life course.

One study that has examined offending during emerging adulthood is Piquero et al. (2002) which examined the impact of emergent adulthood on the criminal activity of male parolees released by the California Youth Authority between the ages of 21 and 28. Piquero et al. (2002) found that arrest rates for both nonviolent and violent offenses peaked in the early 20s, during emerging adulthood. More recently, using data from the National Longitudinal Study of Adolescent Health, Markowitz and Salvatore (2012) examined the influence of social bonds and turning points on race-based offending patterns, finding that emerging adulthood may be influencing both less and more serious offending across racial groups. One of the strongest arguments for the influence of emerging adulthood on offending came from Moffitt et al. (2002). Using a more recent wave of data from the Dunedin study, Moffitt et al. found that at age 26, some adolescent limited offenders had many legal and personal problems including: mental health problems, property offenses, financial problems, and substance dependence. Moffitt stated that members of the Dunedin cohort may still be experiencing many of these problems in their early 20's because of a "new developmental stage called *emerging adulthood*" (p.200). Moffitt et al.'s (2002) conclusion support the idea that emerging adulthood may have influenced the offending patterns of the Dunedin sample as they matured, specifically influencing the offending

patterns of some adolescent limited offenders. The findings of these studies suggest emerging adulthood is an important area of inquiry and may be influencing offending trajectories for some offenders.

Other studies such as Sampson and Laub (2003) have employed latent class models to examine desistance patterns. It should be noted that the goal of the present study is simply to introduce a new conceptual idea, and examine existing data for the influence of emerging adulthood on altering the effectiveness of turning points and social bonds in reducing offending. However, it is important to consider the role of prior studies that have examined offending trajectories over the full life course as they represent an ideal way for future studies to examine the lifelong influence of emerging adulthood on offending patterns over the life course.

Using data from the Glueck's *Unraveling Juvenile Delinquency* Study, Sampson and Laub (2003) attempted to identify latent offender groups based on retrospective patterns of offending in order to address the relationship between age and desistance. The crime-specific analyses of their study revealed five groups of violent and alcohol/drug offenders (328-330), all of whom eventually reduce offending as they age (Sampson and Laub 2003: 328-330). These findings suggest that even if emerging adulthood alters offending trajectories by increasing their incidence of crime, its influence will dissipate as individual's age.

Criminological Context of the Prolonged Adolescent Offender

Drawing mainly on the work of Moffitt (1993) and Moffitt, Caspi, Rutter, and Silva (2001), the prolonged adolescent offender can be placed within the context of existing offender typologies. Moffitt (1993) describes two primary groups of offenders: adolescent limited (AL), which make up most offenders, and the life course persistent offenders (LCP), a smaller and more serious group.

Adolescent limited offenders have mostly normal and healthy childhood backgrounds. Their antisocial behavior coincides with puberty and is largely the result of the confusion experienced through the role-less years between biological maturation and transitioning into the adult world by means of access to mature privileges and responsibilities. Their antisocial behaviors consist mainly of minor, non-predatory, status offenses (e.g., public drunkenness and vandalism) that begin in adolescence and usually desist as they enter young adulthood and are assimilated into the adult social world. It should be noted that some adolescent limited offenders may be 'caught' in the 'maturity gap,' and continue to offend. It is these individuals who are likely to continue to offend as 'prolonged adolescent' offenders.

Conversely, life course persistent offenders commit more serious, predatory crimes and begin offending at an earlier age. Antisocial behaviors of young (LCP) children are aggravated by neuropsychological deficits and social environments characterized by instability, poverty, inadequate or harsh parenting, and weak or disrupted social bonds (Moffitt et al. 2001). As children age, negative relationships outside the family (e.g., poor relations with peers and teachers) are molded by their experiences in early childhood. Throughout the first 20 years of life there is a cumulative effect of the negative transactions between the individual and his or her environment resulting in a disordered personality characterized by physical aggressiveness and antisocial behaviors that continue through midlife (Moffitt et al. 2001).

Here we are introducing the possibility of an addition to Moffitt's taxonomy by classifying those adolescent limited offenders who are caught in the maturity gap. This is of value because it links emerging adulthood to the maturity gap as conceptualized by Moffitt (1993) and Moffitt et al. 2001. The prolonged adolescent offender, defined as an adult between the ages of 18 and 25 who continues to commit low-level, petty offenses (e.g., vandalism, disorderly conduct), lacks a strong bond to conventional society (e.g., lack of religious participation), engages in risky behaviors (e.g., drug use), and is unmarried. The prolonged adolescent offender engages in crime and deviance because of failure to breach the maturity gap (Moffitt et al. 2001) and achieve adult status, as symbolized by reaching the turning points of marriage, stable employment, and completion of higher education.

The prolonged adolescent offender is similar to the adolescent limited offender in that his or her offending is related to dysphoria between biological maturation and social maturation. Unlike the adolescent limited offender, the prolonged adolescent offender has chronologically aged out of adolescence but has failed to breach the maturity gap. Stuck in the emergent adulthood stage of the life course, the prolonged adolescent offender has not transitioned to adult roles (e.g., marriage) and continues to engage in low-level offenses typical of ALs.

LIMITATIONS OF PRIOR RESEARCH

The aforementioned studies support the argument that emerging adulthood is an important new stage of the life course. However, life course criminology has yet to incorporate emerging adulthood. Moffitt et al. (2001) stopped short of examining the latter stages of emerging adulthood in the Dunedin study where the prolonged adult offender would appear. Although Moffitt et al. (2002) followed up this study when participants were age 26 and found support for the influence of emergent

adulthood on offending, that study had two major characteristics that may limit the applicability of its findings. First, the sample did not include females. Second, there was a lack of heterogeneity in the sample, with the participants being mainly White (93%), contrasting with other developed nations such as the United States that have much greater levels of racial diversity.

Previous research in the area of emerging adulthood (such as Arnett 1998, 2000, 2001) has largely addressed risky behaviors like smoking, alcohol consumption, drunk driving, and dangerous sexual behaviors, but has not examined criminal offending in the emergent adulthood phase. The limited research on criminal offending during emerging adulthood (Piquero et al. 2002) used data from the California Youth Authority that may not be generalizable to a national population because the sample consisted of serious juvenile offenders only, instead of a general population sample of those in their early twenties. Other studies that have used national samples (e.g., Markowitz and Salvatore 2012) have only presented cursory examinations of the possible influence of emerging adulthood on offending, and did not examine the possibility of an extension to Moffitt's taxonomy due to emerging adulthood.

Since emerging adulthood is a new area of study and criminal offending within the prolonged adolescent group is largely unexplored, this study breaks new ground by examining the possibility of a new type of offender linking Moffitt's "maturity gap" and emerging adulthood as factors that influence offending in some youths. Analysis of the prolonged adolescent offender may provide new information on the way life course theorists view offender typologies.

METHODS

Data for this study were taken from the National Longitudinal Study of Adolescent Health (Add Health). Add Health is a longitudinal study of adolescents and young adults who were enrolled from 7th through 12th grade during the 1994-1995 academic year (Harris et al. 2003). The purpose of the Add Health study was to create a sample that is nationally representative of adolescents and collect data to measure the impact of social environment including the effects of peers, family, education, religion, and community on adolescent health and general well-being in the United States (Harris et al. 2003). The study was mandated by the U.S. Congress in the National Institute of Health Revitalization Act of 1993.

Add Health data have been collected in four longitudinal "waves." Wave 1 was collected between April and December of 1995 and consisted of more than 6,500 in-school and in-home self-report interviews of participants ranging in age from 11 through 21. Interview

topics included information on employment experience, educational aspirations and expectations, substance use, criminal activities, the ordering of events leading to romantic and sexual partnerships, peer networks, and family composition and relationships (Udry 1998; 2003). Wave 2 data were collected approximately one year later and included follow up questions on the same topics noted above. Wave 3 data were collected between August 2001 and April 2002 when participants were between the ages of 18 and 26. Wave 3 was utilized for this study because it captures information on the sample when they were in the early stage of emerging adulthood, the period most likely where these individuals would be 'stuck' in the maturity gap as conceptualized by Moffitt. Wave 4 was collected in 2008 when the sample was between the ages of 24 and 32. The complete Add Health data set is available in two forms: a restricted sample available to researcher by way of special permission, and a reduced version of all three waves available to the public (this latter version was used for this analysis).

The analytical benefits to be derived from use of this comprehensive, multi-wave longitudinal data set can be seen through the numerous research studies that have used Add Health to examine relationships between socio-biological maturation and offending (Boutwell and Beaver 2008; Beaver, DeLisi, Vaughn, and Wright 2010; Guo, Roettger, and Cai 2008). In addition, the Add Health data reflect a significant degree of racial diversity among participants, a feature that lends itself well to this research and overcomes criticisms of the racial homogeneity found in many longitudinal data sets (e.g., Laub and Sampson 2003).

Establishing Offender Typologies

To examine whether emerging adulthood is influencing offending, prolonged adolescent offenders (AAOs) need to be distinguished from Life Course Persistent (LCP) offenders, as described by Moffitt (1993).[1] Dichotomous "prolonged adolescent" and "life course persistent" offender variables can be created by employing a similar procedure as the one used by Barnes and Beaver (2010), who also used Add Health data. Barnes and Beaver devised a 3-step process to create an "adolescent limited" (AL) variable. First, the wave 1 and wave 2 serious delinquency scales were merged into a single additive scale. Barnes and Beaver (2010) argued that the serious delinquency scale was more appropriate than a general delinquency scale because of Moffitt's hypothesis that LCPs would have greater levels of involvement in serious delinquency than ALs. Using serious delinquency scales will allow for a more accurate distinction between AL and LCP offenders (Barnes and Beaver 2010).

The last step in Barnes and Beaver's process dichotomized the remaining sample into two groups: AL

and LCP offenders. ALs (n = 581) were defined as respondents who scored below the 95th percentile on serious delinquency. AL offenders were assigned a value of "1." Conversely, LCP (n = 289) offenders were defined as respondents who scored *higher* than the 95th percentile. LCP offenders were assigned a value of "0." Moffitt (1993) stated that there might be overlap between the types of offenses ALs and LCPs commit, since LCPs may commit both minor and serious offenses, whereas ALs should participate only in low-level offenses.

This study is cross sectional in nature and focused exclusively on those in the emerging adulthood stage of the life course (wave 3). In order to separate AAOs from the more serious LCPs, we amended Barnes and Beavers procedure. At wave 3 an amended two-step procedure was used. The first step used only the serious crime scale from wave 3 of the data. This adjustment was made because there are approximately 5 years between waves 2 and 3, including data from the earlier waves in the taxonomy at wave 3 which may have artificially inflated the group sizes. The next step created two dichotomous variables, AAOs (0 = all others; 1 = AAOs) and LCPs (0 = all others, 1 = LCPs). AAOs were defined as respondents who scored below the 95th percentile on serious delinquency; LCPs were defined as respondents who scored in the upper 5th percentile. These two variables allowed this analysis to control for offender type and provide a way to compare the rate of offending and drug use for AAOs and LCPs.

It should be noted that the methodology employed here to separate the categories of offenders is limited as we are examining this phenomenon as it happens, compared to a more ideal retrospective design (e.g., Laub and Sampson 2003) that would allow us to identify offenders early in the life course and follow their offending trajectories through old age. However, this study represents a first-step in examining the possible influence that emerging adulthood has on established trajectories, and as such faces challenges and limitations. Add Health is one of the first studies to examine a cohort of emerging adults, as this cohort ages, and more waves of the Add Health data are made available, more sophisticated methods will be employed to identify and separate offender categories.

Dependent Variables

In order to explore the relationships between prolonged adolescent offenders and low-level crime and low-level drug use, two scales that measure these behaviors were created. The crimes in the low-level offending scale included damaging the property of others, stealing an item worth less than $50, buying, selling, or holding stolen property, using someone else's credit card, bank card, or automatic teller card without their permission or knowledge, and deliberately writing a bad check (α=.586)[2]. Responses for the variables were coded 0 = never, 1 = one or two times, 2 = three or 4 times, and 3 = 5 or more times. The 5 items were subjected to principal components analysis (PCA), which yielded a Kaiser-Meyer-Oklin value of .685 that was significant using Bartlett's test of Sphericity. The analysis revealed the presence of one component with an eigenvalue exceeding 1, explaining 38.94% of the variance.

Moffitt (1993) argued that many AL offenders would experiment with drugs and alcohol as a representation of their movement towards independence and maturity. As a result, this study utilized a low-level drug use scale based on operationalization derived from other research that has used the Add Health data (e.g., Barnes and Beaver 2010; Boutwell and Beaver 2008; Beaver et al. 2010).

The wave 3 (α = .621) low-level drug use scale measured the types of low-level drugs used, asking respondents if they had used cigarettes, alcohol, or marijuana since the last interview date. These 3 items were subjected to PCA, with a Kaiser-Meyer-Oklin value of 0.646 and a significant test of Sphericity, supporting the factorability of the correlation matrix. Principal components analysis revealed the presence of one component with eigenvalue exceeding 1, explaining 56.86% of the variance.

Both the low-level crime and drug use scales were summed so that higher values reflected greater levels of participation in non-violent forms of delinquency/crime and drug use. Descriptive statistics for these scales are presented in Table 1.

Table 1. Descriptive Statistics for Dependent Variables

Dependent Variables	N	Mean	SD
Prolonged Adolescent Offending	4850	0.344	0.988
Prolonged Adolescent Drug Use	4856	1.95	1.02

Note: Dependent variables were calculated from data obtained from the third wave of the Add Health survey.

Independent Variables

To examine the effects of demographic variables, age, gender, and race were included in the models. Age was measured as a continuous variable. The relationship between age and crime is a contentious one, with some arguing that the age-crime curve is invariant, having no variation across historical period, geographic location, or other cultural factors (Gottfredson and Hirschi 1990). The opposing viewpoint is that the age-crime curve does demonstrate variance in factors like gender and type of crime (Moffitt et al. 2001; Moffitt 1993; Farrington 1986). While this study does not seek to test the age-crime curve, we hypothesize that if the core research questions are supported this may support the latter viewpoint that the age-crime curve does demonstrates variance based on factors such as delaying traditional turning points.

Gender was coded as "0" for male and "1" for female. Gender is of interest because prior studies (e.g., Laub and Sampson 2003) were conducted largely with male samples. Scholars such as Belknap (2007) argue that female criminality has been largely unexplored relative to male criminality; including gender in this study will address this criticism and provide an examination of the possible differences in male and female offending during emerging adulthood. Further, inclusion of gender allows this study to examine whether the turning points and social bonds that were so effective for the men in Laub and Sampson's study are effective for women.

Moffitt et al. (2001) suggested that the peak of anti-social behavior in females is near the peri-puberal period because girls at this stage are most likely to affiliate with older, delinquent male peers. Based on Moffitt et al's (2001) findings we hypothesize that females during emerging adulthood would be less likely than males to offend as they have "aged out" of the period where they are most likely to participate in delinquent behavior.

Because of the relatively low number of other racial groups (Asian, American Indian, and Hispanic) relative to Whites and Blacks, two dichotomous variables, White (1 = White; 0= all others) and Black (1=Black; 0 = all others) were included in the multivariate models (see Table 2 for demographics and independent variables). Other independent variables for each wave were grouped into several categories that describe either life-course turning points (e.g., marriage) or social bonds (e.g., parental attachment).

Assessing the significance of a "prolonged adolescent offender" effect on patterns of criminality required the creation of a series of life-course transition and social bond indices comprised of relevant socio-cultural variables and applied to wave 3 of Add Health data.

The first is *marital status* which will be included as a dichotomous variable (0 = no; 1 = yes). Since getting married is a traditional turning point, we would expect a significant relationship between being single and engaging in crime at wave 3. A second turning point indicator was whether the subject *has any children* (0 = no; 1 = yes). We hypothesize that those who have children would be more likely to commit crime, as prior research (e.g., Moffitt 1993) has identified precocious parenthood as a potential "snare" that could "catch" an individual into offending. Next, we created a 2-item *parental bonds* scale based on prior studies (Barnes and Beaver 2010; Boutwell and Beaver, 2008; Beaver et al. 2010) that have used the Add Health data. Items included: how close did the respondent feel they were to their mother and how close did they feel toward their dad? Responses to each question were z-scored and summed in additive scales with higher values reflecting greater level of parental attachment. It should be noted that these questions measured perceived closeness with parents and here are being used as a proxy for parental attachment, with those who perceive a stronger bond with parents having a stronger attachment. We hypothesized that those with greater levels of parental attachment would be less likely to offend.

To find out whether military service has an independent effect on crime, a variable available at wave 3 that measured military service (0 = no; 1 = yes) was included. Prior research found that (active) military service acted as a turning point away from crime for previous generations, and military service has often been identified as a social marker of adulthood (Laub and Sampson 2001; Okimoto and Stegall 1987). We hypothesize that those who serve in the military will have lower rates of offending and drug use.

To examine the influence of employment on crime two variables were examined: *hours worked per week* and *how satisfied you are with your job* (higher score = greater level of satisfaction). We hypothesized that those who work more hours will be more likely to offend. This hypothesis is based on prior research (e.g., Wright, Cullen, and Williams 1997) which has found than the more a juvenile works the more likely they are to participate in criminal behavior. In contrast, we hypothesize those with higher levels of job satisfaction will have stronger bonds to employment and will be less likely to offend.

The role of education was examined using *highest grade completed* (higher score = more education) this variable was measured at all three waves of data collection. Completing higher education has traditionally acted as a turning point and social marker of adulthood (Cote 2000). Those who have higher levels of education typically have greater levels of social capital, earn higher salaries, and are less likely to engage in crime.

The addition of an index gauging economic well-being (α=.58) and property owned (α=.55) are included because economic instability has been identified as a characteristic of emerging adulthood (Arnett 2005; Cote 2000). Those in emerging adulthood have less stable employment and incomes, and as a result, have less stability and weaker social bonds. We hypothesized that those who score higher on the *economic instability* (higher score = less economic stability) and lower levels of property owned at wave 3 would be more likely to offend as AAOs. We hypothesized that those who are AAO offenders are less likely to own property because of their failure to reach turning points. The indices we adopted were derived from previous studies such as Haynie, Weiss, and Piquero (2008). The index consists of whether one owns the following items: a residence (house, condo, or mobile home), a motor vehicle (car, truck, or motorcycle), or a computer. The index also includes a question on whether one has a checking account and a credit card. Higher scores on the property owned scale indicate greater levels of property. The

second index is economic well-being. It is based on responses to the following questions: "in the past 12 months was there a time when..." "…you were without telephone service because you did not have enough money to pay the bill," "…did not have enough money to pay the full amount of rent or mortgage," "… were evicted from house/apartment for not paying the rent or mortgage," "…did not pay the full amount of gas, electric, or oil company would not deliver," and "…needed to see a doctor or go to the hospital, but did not because you could not pay the bill."

The final variable examined was *attendance at religious services* (higher score = more participation). Prior studies have argued that emerging adults are less likely to engage in religious services (Arnett 1998), and that religious participation acts to inhibit deviance (Laub and Sampson 2001). We expected that those with higher levels of religious participation will have lower rates of AAO offending and drug use. Descriptive statistics can be found in Table 2.

Table 2. Descriptives of Independent Variables at Wave 3 (N=4880)

Variable	Min	Max	Mean	SD
Age	18	25	22	1.76
Attendance at Religious Services	0	6	2.12	1.95
Current Job Satisfaction	1	5	3.92	0.90
Economic Well – Being	0	5	0.44	0.84
Highest Grade in School	6	22	13.22	1.99
Hours Worked Scale	3	90	36.80	12.48
Parental Attachment Scale	1	10	7.00	2.24
Property Owned Scale	0	5	2.74	1.33

	Frequency	Percentage
Currently Service in the Military		
No	4749	98.3
Yes	76	1.6
Gender		
Females	2629	54.0
Males	2253	46.0
Have Any Children		
No	3340	69.2
Yes	1487	30.8
Marital Status		
Not Married	4028	83.4
Married	801	16.6
Race		
White	2859	59.2
Black	1113	23.0
All Others	851	17.6

RESULTS

Count models were used because the outcome variables consisted of a discrete count of events, in this case either the number of low-level offenses that have occurred in the past 12 months or the number of times low-level drugs were used in the past 12 months (Hilbe 2008). Parameters are presented as Incident Rate Ratios (IRR) given their ease of interpretation. For example, an IRR of 3.0 would suggest a one unit change in the independent variable would be expected to increase the average predicted count on the dependent variable by a factor of 3.0, while holding all independent variables constant. In contrast, an IRR of 0.25 would indicate that a one unit change in the independent variable would be expected to decrease the average predicted count on the dependent variable by a factor of 0.25, while holding all other independent variables constant (Long and Freese 2006).

Offending Scale

Three models were run using the offending scale outcome; results of the final model will be discussed here (see Table 3 for the results of all models). Of the demographic characteristics age and gender were both significant in the final model. For every additional year in age, there was a 9.0% decrease in the incidence of offending, (p < .01, IRR = 0.91). Females, compared to males, while holding all other variables in the model constant, were expected to have a 46.0% lower count of offending (p < .01, IRR = 0.54). Both dummy variables for AAOs and LCPs were significant. AAOs compared to others, had an expected count approximately 3.4 times greater for low-level offending (p < .01, IRR = 3.43) relative to other groups. LCPs, had a 7 times higher rate of offending, compared to other groups (p < .01, IRR = 8.22).

Turning points found to be significant were education and the number of hours worked per week. For participants having higher levels of education there was a 7% *increase* in the rate of offending (p < .01, IRR = 1.07). This result was surprising, as it was expected that having higher levels of education would inhibit offending, a hypotheses supported by existing research (e.g., Lochner and Moretti 2004). The number of hours worked per week was also significant. Every additional hour worked was associated with a 9% *decrease* in the rate of low-level offending, holding all other variables constant (p < .05, IRR = 0.91). Traditional control theory's concept of "involvement" with convention might have predicted this since it argues that more hours working in conventional jobs, gives less time available for delinquency.

Several of the indicators of social bonds were significant including economic instability, parental attachment, and religious participation (see also involvement in convention, above). Economic instability had the strongest impact of the statistically significant social bonds. For every one unit standard deviation increase in the economic stability scale, there was a 36% increase in the rate of offending (p < .01, IRR = 1.36). Parental bonds had the next strongest influence, with an 11% decrease in the incidence of offending, for every one unit increase in parental bonds (p < .01, IRR = 0.89). Religious participation was also significant, for every one unit increase in religious participation, there was a 4.0% decrease in the incidence of offending (p < .05, IRR = 0.96). The next series of models examined the predictive power of the independent variables and drug use.

Drug Use Scale

Three separate models were completed (see Table 4 for results of all models), the last of which will be discussed. Of the demographic variables, both race variables and both offending category variables were significant. Blacks, as compared to other groups, had a 16% lower expected count of drug use (p < .01, IRR = 0.84). Conversely, whites, as compared to other groups, had an expected count 6% higher than other groups on drug use, while holding all other variables constant in the model (p < .01, IRR = 1.06). AAOs, as compared to other groups, had an expected count 26% higher on drug use, holding all other variables constant (p < .01, IRR = 1.26). LCPs, compared to others, had an expected count 32% higher on low-level drug use, controlling for all other variables in the model (p < .01, IRR = 1.32).

Two indicators of turning points, marital status and education, were significant in the full model relating to drug use. Those who were married, as compared to those who were not, had a 6.0% decrease in the count of drug use, controlling for all other variables in the model (p < .05, IRR = 0.94). Education was significant with a 1% increase in the incidence of low-level drug use for every year of additional education, controlling for other variables in the model (p < .05, IRR = 1.01).

Several of the indicators of social bonds included in model were significant including: religious participation, economic instability, parental attachment, and ownership of property. Economic instability and ownership of property were the variables with the strongest relationships to drug use. For economic instability, there was a 5% increase in less serious drug use for every

Table 3. Negative Binomial Regression Models of Independent Variables
on the Prolonged Adolescent Offending Scale

AAO Scale[1]	Model 1			Model 2			Model 3		
	B	[SE]	IRR	B	[SE]	IRR	B	[SE]	IRR
Age	-0.09	(0.021)**	0.92	-0.08	(0.023)**	0.92	-0.01	(0.023)**	0.91
Gender	-0.54	(0.075)**	0.58	-0.55	(0.077)**	0.57	-0.61	(0.078)**	0.54
Black	-0.01	(0.133)	0.99	-0.02	(0.114)	0.98	-0.03	(0.114)	0.97
White	-0.07	(0.097)	0.93	-0.10	(0.098)	0.90	-0.11	(0.098)	0.89
AAOs	1.29	(0.096)**	3.61	1.29	(0.096)**	3.62	1.23	(0.096)**	3.43
LCPs	2.19	(0.106)**	8.96	2.19	(0.106)**	9.01	2.11	(0.106)**	8.22
Military				0.04	(0.288)	1.04	0.07	(0.283)	1.08
Children				-0.07	(0.091)	0.93	-0.10	(0.091)	0.90
Education				0.05	(0.205)*	1.05	0.07	(0.022)**	1.07
Hours Worked				-0.01	(0.004)*	0.99	-0.01	(0.004)*	0.91
Married				-0.18	(0.124)	0.83	-0.17	(0.127)	0.84
Religious Services							-0.04	(0.020)*	0.96
Economic Instability[1]							0.31	(0.057)**	1.36
Job Satisfaction							-0.05	(0.040)	0.95
Parental Attachment[1]							-0.12	(0.037)**	0.89
Property Owned[1]							0.07	(0.073)	1.08
Constant	0.44	(0.468)		0.06	(0.501)		0.52	(0.538)	
* p < .05 ** p < .01	Chi–Square = 645.03 Df = 6 AIC[2] = 1.288			Chi–Square= 664.22 Df =11 AIC[2] = 1.286			Chi–Square= 720.17 Df =16 AIC[2] = 1.277		

1. Values for each variable were z scored and summed.

2. The Aikake Information Criterion (AIC) is based on the log-likelihood function and is a measure
of model fit. Models with the smallest value are considered to have the best fit (Hilbe, 2008)

standard deviation increase in the economic instability scale (p < .01, IRR = 1.05). In regards to property ownership, there was a 5% increase in less serious drug use, for every standard deviation increase in the amount of property owned (p < .05, IRR = 1.05). Religious participation was the next strongest indicator; there was a 5.0% decrease in the incidence of less serious drug use (p < .01, IRR = 0.95) for every standard deviation increase in religious participation. The final social bond that was significant was parental attachment. There was a 3.0% decrease in the incidence of low serious drug use for every one unit increase in the parental attachment scale (p < .01, IRR = 0.97).

DISCUSSION

This study sought to address two primary research questions: Has emerging adulthood extended the active period of offending for some offenders? And do turning points and social bonds reduce crime for emerging adults as they have for prior generations? To address the first question we identified approximately 11% of the sample as Prolonged Adolescent Offenders, another 6% were classified as Life Course Persistent Offenders. The identification of the AAO group provides support for the idea that there is a low-level offending trajectory, similar to Moffitt's adolescent Limited Offender, still actively offending during emerging adulthood. Separating AAOs and LCPs was useful because it allowed a comparison of the count of offending and drugs used for each group, typically finding that AAOs have lower counts of both low-level offending and low serious drug use. These findings provide additional support that AAOs may exist, and they are a less serious offender than LCPs. In regards to our second question we found several turning points and social bonds that did predict changes in the counts of

Table 4. Poisson Regression Models of Independent Variables
on the Prolonged Adolescent Offending Drug Use Scale

AAO Drugs Used Scale[1]	Model 1			Model 2			Model 3		
	B	[SE]	IRR	B	[SE]	IRR	B	[SE]	IRR
Age	0.01	(.006)	1.01	0.007	(.006)	1.01	-0.001	(0.006)	0.99
Gender	-0.04	(.021)	0.96	-0.034	(.022)	0.97	-0.025	(0.022)	0.97
Black	-0.20	(.034)**	0.82	-0.204	(.034)**	0.82	-0.173	(0.035)**	0.84
White	0.90	(.028)**	1.09	0.081	(.028)**	1.08	0.066	(0.028)*	1.06
AAOs	0.26	(.031)**	1.30	0.258	(.031)**	1.29	0.232	(0.032)**	1.26
LCPs	0.32	(.038)**	1.38	0.317	(.039)**	1.37	0.281	(0.039)**	1.32
Military				-0.105	(.087)	0.90	-0.111	(0.087)	0.89
Children				-0.009	(.026)	0.99	-0.021	(0.026)	0.98
Education				0.006	(.005)	1.01	0.015	(0.006)*	1.01
Hours Worked				0.001	(.001)	1.00	0.001	(0.001)	1.00
Married				-0.089	(.031)**	0.91	-0.066	(0.033)*	0.94
Religious Services							-0.048	(0.006)**	0.95
Economic Instability[1]							0.046	(0.017)**	1.05
Job Satisfaction							-0.018	(0.011)	0.98
Parental Attachment[1]							-0.029	(0.010)*	0.97
Property Owned[1]							0.050	(0.021)**	1.05
Constant	0.51	(0.133)		0.39	(0.142)		0.62	(0.154)	
* p<.05 ** p<.01	Chi – Square = 243.6 Df = 6 AIC[2] = 3.04			Chi – Square = 258.9 Df = 11 AIC[2] = 3.04			Chi – Square = 360.2 Df = 16 AIC[2] = 3.02		

1. Values for each variable were z scored and summed

2. The Aikake Information Criterion (AIC) is based on the log-likelihood function and is a measure
   of model fit. Models with the smallest value are considered to have the best fit (Hilbe 2008)

offenses and drugs used. These findings will be discussed below.

Age, gender, and race were included in these analyses as statistical controls. The most relevant findings for this study were regarding the relationship between age and offending. There was a significant, negative relationship found between age and AAO offending. This supports the relationship hypothesized, that offending decreases as people age as well as prior research that has found low-level offending decreases as individual's age over the life course.

Gender was a significant predictor for the models using the low-level offending outcome, with being female predicting lower levels of offending. These findings support the hypothesized relationship that females have lower levels of offending. These findings also provide an indicator that traditional turning points

and social bonds still "work" for females. Further, despite increases in the overall rate of female offending in recent years (Belknap 2007), the findings of this study support prior research that female criminality peaks early in the life course and women offend, at least for the crimes measured in this study, less than men.

Race was not a significant predictor of low-level offending. However, race was a significant predictor of low-level drug use, with Blacks having lower expected counts of low-level drug use. Initially, this finding was surprising, as Blacks have higher rates of arrest and incarceration for drug crimes. However, this finding supports data reported in the National Household Survey on Drug Use and Health, 2005, and other studies that have found Blacks have lower rates of drug use than Whites and other racial/ethnic groups (e.g., Mumola and Karberg 2006).

Higher levels of education were found to increase both low-level offending and low-level drug use. These findings may be explained as typical forms of deviance and alcohol and drug use found on college and university campuses. These findings are of particular importance as they were in the opposite of the direction expected, and were contrary to a large portion of prior research examining the relationship between education and offending. These findings may imply that education interacts differently for those in emerging adulthood possibly due to several factors, including the prolonged adolescence that many experience during emerging adulthood, the increase in the rate of college attendance, and the decrease in informal social controls that accompany many of the delayed turning points during emerging adulthood. Future studies may want to conceptualize the role of education during emerging adulthood as *influencing* low-level offending and drug use and those in emerging adulthood may be participating in high rates of drug and alcohol experimentation.

Military service was not related to either low-level offending or drug use. This finding was not unexpected as only a small number of the participants (n = 76) were actively serving in the military at the time of the wave 3 data collection.

The numbers of hours worked per week were also a significant predictor of low-level offending, with those who worked more hours having lower levels of offending. This finding was in the predicted direction relative to involvement in convention. This may indicate that working more hours works differently for those in emerging adulthood compared to adolescents. The remainder of this section will discuss the findings dealing with social bonds and how they influence criminological theory.

Religious participation was found to reduce low-level offending and drug use. These findings are consistent with previous research and are of value because research in emerging adulthood has found that emerging adults are less likely to attend religious services (Arnett 1998). However, this study found that religious participation is still an effective social bond and, as such, has utility in explaining the relationship between offending and drug use for emerging adults. Furthermore, drug and alcohol treatment programs targeting emerging adults may want to incorporate a faith-based component, as religion may provide a key factor in drug rehabilitation.

One of the most interesting findings dealt with economic instability which was related to both low-level offending and drug use, with those having higher levels of economic instability having higher expected counts of both behaviors. This is of importance for criminological theory because it supports the idea that economic instability is a significant predictor of offending and drug

use for emerging adults. The role of economics has been included in prior theoretical discussions (see Wilson 1987; 1996), but recent economic shifts that have led to emerging adulthood, as well as the current economic crisis may play a vital role in offending patterns of emerging adults. Life course theory in particular, should place greater emphasis on economic well-being, a concept typically discussed in other theoretical arenas such as strain theory. Merton's (1938) theory argued that society's mainstream culture places pressure on individuals to accomplish societal goals, such as a middle class lifestyle reflected in the notion of "The American Dream," but that few actually have access to the opportunities and means necessary to reach these goals. This mismatch between cultural goals and structural means to achieve them leads some to use crime as an innovative adaptation to this to this societal strain and as a way of attaining cultural goals. The cultural pressure to achieve society's (material) goals has increased since Merton first proposed his theory, yet, as discussed extensively here, many have a decreased likelihood of living a middle class lifestyle and attaining those goals. Future studies may want to integrate Arnett's theory of emerging adulthood with strain theory and the increasing mismatch of goals and means due to the economic downturns of the last several years.

Parental attachment was a predictor of low-level offending, with higher levels of parental attachment predicting a reduction in low-level offending. These findings support prior studies (e.g., Hirschi 1969; Moffitt et al. 2001) and support the hypotheses that bonds with parents are a valid and important relationship that can reduce offending for emerging adults. The findings of this study indicate that theorists should continue to place an emphasis on familial bonds as they explore theoretical explanations of criminal and delinquent behaviors.

Other measures of turning points and social bonds were not found to be significantly related to crime and drug use. These findings are inconsistent with prior research (Arnett 1998; Chassin et al. 2002; Laub and Sampson 2003; White et al. 2005). It is possible that marriage may no longer be as strongly related to criminal behavior because the social changes that have contributed to emerging adulthood prevent marriage from serving as the major turning point it once had in the past. Alternatively, marriage has been increasingly postponed, and it is possible that the influence of marriage on offending trajectories may not been seen until the sample is older and more participants are married. Additionally, other forms of relationships (e.g., cohabitation, same-sex relationships) may need to be examined as they may function as a proxy for traditional marriage.

Future Research/Limitations

Like many prior studies, the findings of this project answer many questions, but also bring others to the forefront. One important avenue for future research will be the long-term influence of emerging adulthood for the "prolonged adolescent" offender and life course persistent offenders. As discussed previously, future studies using these data may be able to identify offending trajectories retrospectively, a more suitable way to identify and compare types of offenders.

There were two limitations to this study that are of interest. First, the diminished role of military service is important because prior studies found military service acted as a turning point for most away from crime and deviance for the World War II generation, but was less effective for later generations. What has yet to be explored thoroughly is how military service has impacted emerging adults, particularly those serving in the Middle East. This current conflict, like Vietnam, has been contentious in general society, with much initially supporting military presence, but as time has passed, the presence of the military has become more controversial. Based on the findings of studies using samples of Vietnam veterans (see Write, Carter and Cullen 2005), it is possible that military service may act as a negative turning point for emerging adults. In contrast, public sentiment supporting the conflict in the Middle East has cooled over time, but overall support for those in the military has remained fairly consistent, and they have yet to face the same level of vitriol from the public (e.g., protests against soldiers, refusal to hire veterans) that those who served in Vietnam experienced. As a result, modern veterans may not experience military service as a negative turning point. Future studies may seek to examine data gathered from those who have served in the most recent Middle East crisis. A detailed qualitative analysis using a sample of emerging adults would help clarify the role of military service as a turning point for modern cohorts.

Another limitation is that these data were limited to a sample of emerging adults in the United States. It is possible that social and cultural differences between nations may influence how turning points and social bonds operate cross nationally. Future studies may want to compare samples such as the Add Health cohort with those from European or African nations in order to study the influence of culture on both emerging adulthood and the role of age-graded transitions in reducing offending.

CONCLUSION

This study examined the criminogenic effects of emerging adulthood and provided empirical support for a new conceptual idea, the prolonged adolescent offender. Results supported many previous findings about factors that influence participation in criminal and delinquent behaviors and had implications for both criminological theory and criminal justice policy. In regards to theory, findings of this study support the notion that emerging adulthood may be an important component of offending in young people today, possibly altering the offending trajectories of low-level offenders past the traditional point of desistance. Studies are needed to explore the long-term effects that emerging adulthood has on offending.

The findings of this study have potential policy implications as well. Prolonged adolescent offenders commit crimes usually seen in adolescents, but unlike most adolescent offenders (e.g., Moffitt's AL's), they face adult prosecution and penalties. Early intervention and diversion programs such as drug courts could target those in emerging adulthood, so that they may avoid further criminogenic effects of incarceration and decrease extended costs to the criminal justice system. Policy makers may find it beneficial to recognize the unique age effects of emerging adulthood. Because many low-level, delinquent offenses traditionally seen in teenagers are now seen in emerging adults, policies may need to be adapted to the needs of cohorts that differ substantially from their predecessors. Instead of adopting purely punitive or reactive measures, greater emphasis may need to be placed on primary and secondary prevention strategies (Center for Disease Control and Prevention 2004).

Acknowledgement

Endnotes

[1] It should be noted that this study is a preliminary examination of the prolonged adolescent offender. As future waves of the Add Health Study are conducted and data released a retrospective approach may be employed to more accurately identify prolonged adolescent offenders and explore the long term influence of emerging adulthood on offending over the life course.

[2] Coefficient alpha is one of the most commonly used measures of reliability. Not only is it influenced by the average correlation among items (internal consistency), but also by the number of items in the scale (Nunnally, 1978). As a result, it may be difficult to obtain a high alpha, especially in longitudinal data where variables present at one wave may not be present at the next. Psychometricians (e.g., Cronbach, 1951; 1970) have warned of this limitation, but it is often overlooked (Welsh, 2001). Further, alpha coefficients in the .40-.50 range have generally been considered acceptable for etiological research (Thorndike, 1971).

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Delinquent Friends and Reactions to Strain: An Examination of Direct and Indirect Pathways

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Abstract: *Strain theorists acknowledge that only some strained individuals become involved in delinquency. Thus, a necessary research objective is to determine the conditions under which strain results in deviant adaptations. The goal of this research is to examine the conditioning effects of exposure to delinquent friends/peer pressure on the relationship between strain and delinquency. Whereas Agnew (1992, 2001, 2006) argues that a criminogenic environment will increase the effect of strain on delinquency, Warr's (1993) research indicates that other correlates of delinquency lose their influence when adolescents are enmeshed in a network of delinquent peers. In testing these competing hypotheses, the current research finds a preponderance of evidence supporting the latter position. Peer pressure and having friends that commit delinquency tend to reduce the direct effect of strain on serious delinquency, as well as reducing the indirect effects of strain on negative emotions and negative emotions on serious delinquency.*

Keywords: abuse, anomie theory, delinquent friends, and general strain theory.

INTRODUCTION

Exposure to delinquent friends and peers is consistently found to be a strong correlate of adolescent delinquency (see Warr 2002 for a review). Moreover, the impact of delinquent peers and friends, concepts generally associated with differential association, social learning, and subculture theories of delinquency, has for decades served as an issue of contention within the field of criminology in debates on the theoretical supremacy on control theories.[1] However, simply examining the additive effect of central variables from various theories of delinquency, such as peer delinquency, represents an overly simplistic attempt to model a reality that is rarely additive in form. Rather, the social context and causes of juvenile delinquency are almost certain to involve the interaction of variables from

multiple sociological theories of delinquency. Consequently, it is likely that delinquent friends and peers, in addition to their strong main effect on delinquency, also exert a *conditioning* effect within the context of criminological theories which do not include these measures as primary theoretical variables (for example, see Agnew 1991).

The current research represents an effort to increase our theoretical knowledge of the conditioning role of delinquent friends within the framework of Agnew's General Strain Theory (GST). In his theoretical development and empirical tests of GST, Agnew (2001, 2006) suggests that the social environment of adolescents in general will influence whether they react to strain in a delinquent fashion. Regarding delinquent peers and friends specifically, he predicts that associations with criminal others will increase the likelihood of coping with strain in

a criminal fashion, primarily because delinquent peers/friends are empirically associated with beliefs favorable to crime "that define crime as a desirable, justifiable, or excusable response to strains" (Agnew 2006:101).

A number of studies empirically examine the conditioning effect of delinquent peers on the relationship between strain and delinquency, but results are mixed and theoretical conclusions remain elusive. Moreover, although Agnew (1992) argues that strain has a substantial indirect effect on delinquency via its impact on negative emotions, empirical and theoretical attention is sorely lacking regarding the conditioning effect of delinquent peers on these indirect pathways. Consequently, a primary goal of the current research project is to more thoroughly and explicitly develop our theoretical understanding of the conditioning effect of peer deviance on the direct and indirect effects of strain on serious delinquency. Towards this goal, theoretically derived hypotheses are empirically tested on a nationally representative sample of adolescents.

GENERAL STRAIN THEORY

Within the anomie/strain perspective made popular by Merton (1938), strain is viewed as the blockage of goal-seeking behavior. In contrast, Agnew (1985) argues that the blockage of *pain avoidance* is a source of strain that is particularly salient for adolescents, because youth often find themselves in aversive situations from which they have no legal means of escape. Adolescents are obliged to live with their family, go to a certain school, and live in a certain neighborhood where they must interact with certain people. Moreover, adolescents' lack of freedom over the people and environments in which they live has been found to affect their vulnerability to victimization in the forms of both abuse and street crime (Finkelhor and Hashima 2001). Aversive conditions found in any of these contexts are generally unavoidable, and Agnew (1985) suggests that the inability to avoid these aversive situations produces frustration within adolescents that heightens their propensity to commit delinquent behavior. Delinquency may result from an aversive environment through attempts by the adolescent to avoid the situation (e.g. running away from home or school), or frustration and anger may cause the adolescent to strike out at the source of the strain or an unrelated target (e.g. assault, vandalism).

According to the tenets of General Strain Theory, motivation for delinquency stems from anger and other negative emotions that result from negative relations with others (Agnew 1992). Agnew defines negative relationships with others quite broadly as "relationships in which others are not treating the individual as he or she would like to be treated" (Agnew 1992:50). These negative relationships are hypothesized to result in three different types of strain: (1) the failure to achieve positively valued goals, (2) the removal of positively valued stimuli, and (3)

the presentation of negative stimuli. Each of these forms of strain is hypothesized to increase the likelihood that adolescents will experience negative emotions such as depression, fear, and anger. Agnew (1992) places an emphasis on anger and negative emotionality as factors that intervene between strain and delinquency because anger can increase an individual's level of felt injury, create a desire for revenge, and/or motivate an individual for action. Consequently, strain that produces anger and other negative emotions is most likely to increase adolescents' predisposition for delinquency.

Empirical Support for General Strain Theory

Numerous researchers have found that measures of social-psychological strain influence juvenile delinquency (e.g., Agnew 1989; Agnew and White 1992; Agnew et al. 1996; Hoffmann and Miller 1998; Hoffmann and Su 1997; Mazzerolle 1998; Paternoster and Mazerolle 1994), while additional studies examine the mediating effect of negative emotions on the relationship between strain and delinquency (for example, Agnew 1985; Aseltine et al. 2000; Brezina 1996; Brezina 1998; Broidy 2001; Mazerolle and Piquero 1997; Mazerolle and Piquero 1998). Research has also attempted to model the complexity of delinquency causation through a focus on factors that might condition the impact of strain on delinquency (for instance, Agnew et al. 2002; Agnew and White 1992; Aseltine et al. 2000; Baron 2004; 2007; Eitle and Turner 2002; 2003; Harrell 2007; Hoffmann and Miller 1998; Mazzerolle et al. 2000; Mazerolle and Maahs 2000; Mazerolle and Piquero 1997; Morash and Moon 2007; Paternoster and Mazerolle 1994).

Strain and Delinquent Friends

The presence or absence of delinquent friends is one of the best predictors of delinquent behavior, and this empirical relationship plays a central role in a number of common theories of delinquency such as social learning theory, differential association theory, and subculture theories (Warr 2002). Although the number of delinquent friends reported by adolescents generally has a substantial, positive main effect on one's own delinquency, the conditioning effect of delinquent peers or friends on the relationship between strain and delinquency is less clearly documented. Agnew (1992) views exposure to delinquent role models as an important factor influencing an adolescent's disposition to delinquency, and predicts that adolescents facing exposure to delinquent peers and peer pressure will be more likely to respond to strain with delinquency than youth that are insulated from these peer influences. Adolescents with delinquent friends are more likely to adopt delinquent forms of coping with strain because these associates can serve as delinquent role models that instill delinquent values (Agnew 1999; Agnew

and White 1992; Aseltine et al. 2000) or provide additional opportunities for delinquency (Agnew and White 1992; Warr 2002). I refer to this as the *vulnerability hypothesis.*

Whereas Agnew asserts that exposure to delinquent peers makes adolescents more vulnerable to the crimino-genic influence of strain, a competing hypothesis suggests that exposure to strain would have little impact on the delinquent behavior of adolescents with many delinquent friends. In part, this alternative hypothesis is a testament to the strength of the delinquent peers/delinquency relationship. For example, research by Warr (1993) indicates that attachment to parents does not reduce the impact of delinquent peers among those adolescents who have already been exposed to delinquent peers. In his analysis of the direct effects and interaction effect of parents and peers on delinquency, Warr concludes that, "Although attachment to parents may inhibit the development of delinquent friendships, it apparently does little to reduce delinquency among those who already have delinquent friends" (1993:257).

I argue that a similar process might be applicable when considering exposure to strain in the context of delinquent peers/friends, such that *strain will have little impact on youth who are exposed to friends with high levels of delinquent involvement and are exposed to peer pressure to commit delinquency, yet will retain a significant, positive impact on youth with few or no delinquent peer influences.* I will refer to this as the *irrelevance hypothesis*, in that a high level of exposure to friends that are delinquent, combined with an exposure to a high level of peer pressure to commit delinquency, might render the presence or absence of strain irrelevant as a cause of delinquency. In addition to these hypotheses that delinquent friends cause youth to become more or less vulnerable to strain, the null hypothesis is that exposure to delinquent friends has no conditioning effect on the relationship between strain, negative emotionality, and delinquency.

Moderation of the Indirect Effect of Strain on Delinquency

In describing general strain theory, Agnew suggests that, in addition to any direct impact that strain has on delinquency, strain should have an indirect effect on delinquency via negative emotions such as anger. Although it is clear that youths' social contexts might condition the direct effect of strain on involvement in juvenile delinquency, an obvious omission in this literature is an analysis of the impact of conditioning factors on the pathways that reflect the *indirect* effect of strain on delinquency specified by Agnew's general strain theory. In other words, aspects of one's social environment might alter the relationship between strain and feelings of anger/negative emotions, and social context might also alter the relationship between anger/negative emotions and

a youth's involvement in juvenile delinquency. The current study will examine the conditioning effect of one particularly salient factor for juvenile delinquency causation, exposure to delinquent friends and peer pressure, on both the direct and indirect relationships between strain and delinquency.

The vulnerability and irrelevance hypotheses are applicable to these indirect effects as well. For instance, the impact of strain on negative emotions might be more or less substantial in the presence of delinquent peers/peer pressure. Similarly, the impact of negative emotions on delinquency might be more or less substantial in the presence of delinquent peers and peer pressure.

Previous Research on GST and the Conditioning Effect of Delinquent Peers

A number of previous studies have addressed the conditioning effect of delinquent peers within general strain theory. The *vulnerability hypothesis* found some support in these studies. In an early test of GST examining a sample of New Jersey adolescents, for instance, Agnew and White (1992) detect a positive interaction between strain and delinquent friends. In their cross-sectional models, strain has a more substantial impact on adolescents who score higher on a measure of delinquent friends, supporting the idea that a criminogenic environment causes adolescents to be more susceptible to strain. In research on a sample collected from a suburban high school in the Midwest, Mazerolle et al. (2000) found a positive interaction between strain and a measure of the criminal involvement of the adolescents' friends and family members. A study by Mazerolle and Maahs (2000) has the advantage of utilizing a nationally representative sample, the National Youth Survey. These researchers also find that adolescents exposed to higher levels of delinquent peers are more susceptible to the criminogenic influence of strain. A potential shortcoming of this study is its reliance on contingency table analysis that does not allow for the use of statistical controls. Although these findings appear to confirm the vulnerability hypothesis, it is unclear whether these results would persist in a multivariate context. An additional study (Baron and Hartnagel 2002) examines interactions between labor market strain and a variety of types of crime among street youth. It was found that delinquent peers increase the impact of labor market strain on property crime, but not on violent crime or drug use. In another study of street youth, Baron (2004) found that deviant peers made youth more vulnerable to strain in the form of relative deprivation. However, a follow-up study indicated that this finding held for males only (Baron 2007). Examining a sample of South Korean youth, Morash and Moon (2007) found that vulnerability to a variety of forms of strain was increased by associations with delinquent peers for females. In comparison, associations with delinquent peers caused

males to be more vulnerable only to strain in the form of abuse by teachers. In summary, these findings indicate that delinquent peer/friend associations can increase the vulnerability of certain samples of youth to certain types of strain. The contingent nature of these findings suggests that additional research is obviously need to determine the robustness of these results.

Despite studies supporting the vulnerability hypothesis, other research lends support only to the *null hypothesis* that levels of delinquent peers/friends do not condition the relationship between strain and delinquency. For example, in Agnew and White's (1992) study described above, their longitudinal models failed to find a significant interaction between strain and delinquent friends. Paternoster and Mazerolle (1994) report similar null findings in an analysis of GST using the National Youth Survey and Mazerolle and Piquero (1997) also report null findings in an additional study examining a sample of college students. Finally, Agnew et al. (2002) did not find significant interactions between strain and troublesome friends in a national sample of adolescents.

In contrast to studies consistent with vulnerability hypothesis or null hypothesis, other research supports the *irrelevance hypothesis*, suggesting that the impact of strain on delinquency tends to become irrelevant at higher values of exposure to delinquent peers/friends. For example, a study by Hoffmann and Miller (1998) examining strain theory through a latent variable analysis indicates that adolescents with high levels of delinquent peers are less vulnerable to strain than adolescents with low levels of peer delinquency. Moreover, Hoffmann and Miller report that under certain conditions, strain can actually reduce delinquency. Specifically, negative life events measured at time two of their study have a negative effect on delinquency measured in the following year among adolescents with high peer delinquency, and this coefficient is significantly less than the corresponding coefficient for youth with low levels of peer delinquency. Similarly, Aseltine et al. (2000) found that stressful life events did not predict delinquency in the context of high peer delinquency, but were strongly related to delinquency in the context of more conventional peers. These studies rely on non-representative samples, however, so the findings may not be generalizable to the general population of adolescents. Finally, Harrell's (2007) analysis of data from the National Youth Survey also supports the irrelevance hypothesis, in that the impact of strain was actually reduced in the presence of delinquent peers. Harrell provides no theoretical explanation for this finding, but rather explains it away as a possible artifact of collinearity within the model.

In summary, the existing literature on the conditioning effect of delinquent peers within general strain theory provides mixed results from studies that suffer methodological shortcomings such as non-representative samples or the absence of important control variables. The strengths of the current research project include the use of a nationally representative sample of adolescents, the inclusion of relevant control variables, and the use of negative binomial regression to properly model the dependent variables. The most unique contribution of the current research, however, is addressing the possibility that exposure to delinquent friends and peer pressure conditions the *indirect effect* of strain on delinquency.

DATA, MEASURES AND METHODS

Data

Data for this study come from the National Survey of Adolescents in the United States (Kilpatrick and Saunders 1995). These data provide a household probability sample of 4,023 adolescents aged 12-17 who were interviewed via telephone. Of this total, 3,161 were a national probability household sample of adolescents and the remaining 862 individuals were an oversample of adolescents from households in areas designated as central cities by the 1990 U.S. Census. The central city oversample was designed to increase the number of racial/ethnic minority subjects. To correct for any demographic discrepancies between the final sample and U.S. population proportions, the data are weighted on the basis of age, race, and gender. This weighting coefficient is used to bring the sample in line with U.S. Bureau of Census 1995 estimates in terms of these three characteristics.

This study may have potentially excluded adolescents residing in institutional settings, adolescents without a parent or guardian, or adolescents whose parents did not speak English or Spanish. According to the 1990 census, 5% of households do not have telephones. In addition, methodologists estimate that 2% of parents of adolescents from households with telephones do not speak English or Spanish (Kilpatrick and Saunders 1995). As a result, it is estimated that the sampling frame covers approximately 93% of U.S. adolescents living in households. Of 5,367 eligible household, 4,023 adolescents agreed to participate and completed the interviews, for a participation rate of 75%.

The sample is approximately half male (51%) and half female (49%). The ages of the adolescents ranges from 12 to 17, with a mean age of 14.48. Regarding race, the largest proportions of the sample are white (72%), African American (15%), and Hispanic (8%). Descriptive statistics are found in Table 1.

Table 1. Descriptive Statistics

Variable	Mean or Percent*	Standard Deviation	Min	Max	N
Dependent Variable:					
Serious delinquency	0.63	5.13	0	100	3920
Strain Variables:					
Negative life events	2.20	1.77	0	10	3939
History of victimization	7%		0	1	3924
Recent victimization	11%		0	1	3924
History of abuse	8%		0	1	3942
Recent abuse	2%		0	1	3942
Intervening Variable:					
Negative emotionality	1.73	2.96	0	18	3850
Conditioning Variable:					
Delinquent friends	2.88	4.24	0	36	3927
Control Variables:					
Household income	5.42	1.96	1	9	3718
Parental education	5.99	1.47	1	9	3933
Violent community	1.22	0.85	0	3	3942
Witnessed violence	1.29	1.11	0	5	3915
White	72%		0	1	3942
Black	15%		0	1	3942
Hispanic	8%		0	1	3942
Other Race	5%		0	1	3942
Age	14.48	1.70	12	17	3934
Male	51%		0	1	3942
Female-headed household	21%		0	1	3939
Number of children	2.39	1.22	1	9	3916
Social support	91%		0	1	3939
Early deviance	8%		0	1	3942

* Mean and standard deviation are presented for continuous variables. Percentages are presented for categorical/dummy variables.

Strain

Due to data considerations, this research will primarily focus on strain in the form of negative stimuli. Such noxious stimuli might lead to delinquent behavior if the adolescent attempts to escape from the negative stimuli or seeks revenge against the negative stimuli or similar targets (Agnew 1992). In addition, exposure to negative stimuli and the resulting anger and negative emotions may lead to general acting out behaviors and delinquency such as vandalism.

The five measures of strain adopted in this study are a stressful life event, past harsh physical punishment, recent harsh physical punishment, past victimization in the form of assault, and recent assault victimization. The scale of *stressful life events* is composed of ten items reflecting events that might have occurred in the last year. Some examples of life events include a parent losing a job, the death of a close friend, or getting a failing grade on a report card. The alpha level for the stressful life events scale is 0.550, but reliability analysis is generally not an

appropriate strategy for life event scales because many such life events are assumed to be independent (Newcomb and Harlow 1986; Thoits 1983). Life event scales are generally presented as count scores, because researchers are interested in the cumulative impact of life events on the manifestations of stress (Agnew 1992). A complete list of the items composing this scale is found in the appendix.

Each measure of *harsh physical punishment* is a categorical variable reflecting physical actions taken against the adolescent by a parent or guardian as a form of punishment. This measure includes spankings that left marks, bruises, cuts, or welts, as well as spankings so severe that the youth had to see a doctor. The measure also includes punishments that involved burning, cutting, or tying up the child. Agnew (1992) suggests that recent stressful events should be more influential than distant events. To reflect the influence of recency, a dichotomous variable is created to reflect the experience of harsh physical punishment in the last year. Although Agnew

stresses the recency of strain, other research suggests that long-lasting abuse, such as a history of child abuse, is most likely to result in negative emotionality (Terr 1991). Consequently, a second variable reflects a history of harsh physical punishment that occurred more than one year ago.

The final measures of strain reflect being a *victim of assault* at the hands of strangers, family members, or friends. The variables indicate whether an adolescent was a victim of physical assault, including being beaten up with fists, threatened with a weapon such as a gun or knife, or attacked with a stick, club, bottle, gun, knife or other weapon. Similar to the previous measure, one variable reflects recent victimization, while a second dichotomous variable reflects victimization more than one year ago.[2]

Negative Emotionality

Agnew (1992) theorizes that individually experienced strain increases the likelihood that adolescents will experience a range of negative emotions, and that anger is a central emotional reaction for testing GST. Negative emotions such as anger are of central importance for the production of delinquency, according to Agnew, because they increase an adolescent's level of felt injury, might create a desire for revenge against the source of the strain, and have the potential to lower an adolescent's inhibitions, increasing the propensity for deviance. The current study will examine the intervening effects of a twenty-item scale reflecting negative emotions consistent with symptoms of post-traumatic stress disorder (PTSD)[3]. A complete list of the items composing this scale is included in the appendix.

This measure has a number of strengths. First, this scale provides significantly more information than a single-item indicator of anger or a dichotomous variable reflecting a diagnosis of PTSD. Second, the scale includes an item reflecting heightened feelings of anger, the emotion that Agnew stresses as an important mediator of the direct effect of strain on delinquency. Third, a primary characteristic of PTSD is an individual's involuntary recollection of a stressor or stressors. In other words, the individual psychologically re-experiences the original trauma or victimization. PTSD also produces arousal symptoms such as irritability, anger, hyperalertness, fearfulness, and strong physiological reaction to trauma-related situations (Haapasalo and Pokela 1999). As such, PTSD is an excellent indicator of negative emotionality that serves as a link between past strain and current delinquent involvement among adolescents. In fact, psychologists have developed a "trauma", or "post-traumatic", model of violence in which traumatic experiences in childhood, such as physical abuse, may cause short- and long-term post-traumatic symptoms, which can promote subsequent deviant behavior (Haapasalo and Pokela 1999). Finally, empirical evidence shows that criminal victimization is linked to the experience of PTSD (Andrews et al. 2000; Berton and

Stabb 1996; Freedy et al. 1994; Kilpatrick et al. 1987; Mccloskey and Walker 2000; Resnick et al. 1992), family violence is predictive of PTSD (Mccloskey and Walker 2000; Riggs et al. 1992), negative life events are linked to PTSD (Mccloskey and Walker 2000), and PTSD serves as a mediator between experiences of victimization and subsequent deviance (Epstein et al. 1998).

Delinquent Friends and Peer Pressure

The measure of delinquent friends takes into account not only the involvement of the adolescents' friends in delinquent behavior, but also the extent to which their friends encouraged them to become involved in activities in violation of the law (peer pressure). The benefits of this measure are twofold. The first advantage of this measure is in relation to a critique developed by Gottfredson and Hirschi (1987). Specifically targeting the National Youth Survey, they argue that the correlation between friends' delinquency and subjects' own delinquency is a methodological artifact, because the delinquent peers questions ask how often adolescents' friends have committed various delinquent acts whereas the measure of delinquency is based on questions asking adolescents how often they themselves have committed the identical acts. Gottfredson and Hirschi (1987) suggest that the relationship between the two measures may be a result of a response effect as adolescents refer to their own activities in responding to each set of questions. In the current survey, the questions addressing friends' delinquency include a number of behaviors that are not included in the list of questions referring to the adolescent's own delinquency, and the questions addressing similar behaviors are worded differently. Due to the differences in the behaviors they address and the language used, the possibility of a response effect is substantially reduced in the current sample.

A second advantage of the measure of delinquent friends is its explicit inclusion of "peer pressure" in capturing the influence of friends on the behavior of adolescents. To operationalize the construct, the adolescent reported the number of delinquent activities in which his or her friends have participated, and this value is multiplied by the proportion of friends suggesting that they should do something against the law, ranging from "none or very few of them" (coded as "1") to "all of them" (coded as "4"). The result is a scale, ranging from 0 to 36, representing friends' involvement in delinquency *and* the peer pressure that adolescents face as their friends encourage them to participate in delinquent acts. Items included in this scale are listed in the appendix.

Delinquency

Delinquency is represented by a modified version of the index offenses scale from the National Youth Survey

(Elliot and Huizinga 1983). The scale captures six serious offenses: 1) stealing or attempting to steal something worth more than $100, 2) stealing or attempting to steal a motor vehicle, 3) breaking and entering, 4) gang fighting, 5) strong-arm tactics, and 6) serious assault. The scale is a summation of six items reflecting counts or frequencies in which the adolescents have committed each offense within the last 12 months.[4]

Controls

A series of control variables is included in the multivariate regression models to ensure that the effects of the theoretical variables are not spurious. Due to their consistent association with delinquency, the *age* and *sex* of the adolescents are included in the multivariate models. Controls are also included to represent *female-headed households* and the *number of children in the household* aged eighteen and under. These two variables have represented proxy measures of "direct" parental control within the social control literature (Wells and Rankin 1988). The female-headed household variable is scored as a "1" if the household is consists of a mother alone, the mother with a relative (not a stepfather), or a single female guardian. In contrast, the variable is scored as "0" if the household consists of a mother with stepfather, father alone, father with relative, father with stepmother, single male guardian, or foster parents.

A measure of *social support* is also included in the models. This variable represents whether the adolescent had someone to count on or depend on throughout childhood, parent or otherwise. Scales for head of household's *education* and household *income* where included as controls for socio-economic status. Descriptions of the scales are found in the appendix.

Two questions were used to determine the youths' racial category. First, adolescents were asked if they were of Spanish/Hispanic origin. Next, adolescents were asked if they fell in the category of White/Caucasian, African-American (Black), Asian (Oriental), American Indian or Alaskan Native, or Pacific Islander. Respondents of Spanish/Hispanic origin, regardless of racial category, were classified as Hispanic. All non-Hispanics we classified as White, Black or Other Race.

Measures of self-reported level of *violence in one's community*, as well as the number of *violent events witnessed,*[5] are included in the models as controls for environmental or neighborhood context. For the former measure, youth were asked "how much of a problem is violence in your community" with four response categories ranging from "not a problem at all" to "a very big problem."[6] Regarding the latter, youth were asked how often they had seen violent attacks in their school, neighborhood, home, or elsewhere. This measure could vary from zero to five, as youth were asked if they had seen someone 1) shot, 2) stabbed or cut with a knife, 3)

mugged or robbed, 4) threatened with a knife, gun or other weapon, and/or 5) beaten up, hit, punched, or kicked such that they were hurt pretty badly. The alpha level for this scale was 0.607.

The final control variable is a measure of *early deviance* indicating whether the adolescent began smoking or drinking regularly more than one year prior to their interview. Because the mean age of the sample is 14.5 years, this measure is capturing deviant substance use occurring early in the lives of the youth. Consequently, this is a proxy measure controlling for an early propensity for deviant behavior.

Analytical Strategy

The dependent variable in this analysis is a count variable reflecting the number of self-reported serious delinquent acts each adolescent committed over the last twelve months. Because the conditional variance of this count variable exceeds the conditional mean[7] (a condition known as overdispersion), negative binomial regression is the most appropriate technique for conducting multivariate analysis (Osgood 2000).

RESULTS

The conditioning effect of delinquent friends/peer pressure is tested through the inclusion of multiplicative terms between each measure of strain and the measure of delinquent friends in a series of negative binomial regression models. Prior to computing the multiplicative terms, each continuous variable (delinquent friends/peer pressure, negative emotionality, and negative life events) was centered at its mean. Centering allows one to interpret main effects in models that contain multiplicative terms as the effect of one variable on the dependent variable for respondents who have average values on the other main effect (Aiken and West 1991). Centering also alleviates multicollinearity among the main effects and interaction terms. Variance inflation factors (VIF) were calculated for all of the independent variables, including the interaction terms, one at a time, in the same fashion that the interactions are entered in the subsequent models. The largest VIF scores are associated with *delinquent friends* (1.812) and the interaction term of *recent victimization* x *delinquent friends* (1.807) and these scores are well below those that would indicate a concern with multicollinearity. VIF scores below 1.800 were found for all other independent variables in the models.

The variables representing delinquent friends/peer pressure and number of children under age 18 in the household were logged-transformed to reduce skewdness. Values presented in the table of descriptive statistics represent the non-transformed variables in their original metric.

Direct Effects

To test for conditioning influences on the direct effects, a separate model is run for each of the five measures of strain, including a product term between the delinquent friends/peer pressure and the relevant measure of strain, controlling for all other forms of strain and control variables included in the main effects model. The final weighted sample size for each model, including each individual with full information on all variables in the analysis, is 3493. Models testing for conditioning effects of delinquent friends/peer pressure on the direct effect of strain on delinquency are displayed in Table 2. In each of the first three models, the main effects of strain and delinquent friends/peer pressure are positive and, with the exception of the measures of physically abusive punishment, significant. In contrast, the interaction terms are significant and negative: a history of abusive punishment and delinquent friends/peer pressure (β =-0.59), recent abusive punishment and delinquent friends (β = -1.13), and a history of victimization and delinquent friends (β = -0.53). In the other two models, the interaction terms are also negative, but are not significant. Thus, the general trend is that the effect of strain on delinquency decreases as levels of delinquent friends/peer pressure increases.

Table 2. Negative Binomial Regression Coefficients Representing the Conditioning Effect of Delinquent Friends on the Direct Effect of Strain on Serious Delinquency, With Relevant Controls (N = 3493)

	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)
History of abuse	0.82 (.44)	0.29 (.31)	0.30 (.30)	0.30 (.30)	0.30 (.30)
Recent abuse	0.34 (.51)	1.15 (.53)*	0.27 (.48)	0.34 (.49)	0.34 (.47)
His. of victimization	0.71 (.23)*	0.64 (.24)*	1.10 (.31)*	0.70 (.24)*	0.69 (.24)*
Recent victimization	1.20 (.21)*	1.17 (.22)*	1.15 (.22)*	1.37 (.31)*	1.19 (.21)*
Negative life events	0.18 (.04)*	0.17 (.04)*	0.17 (.04)*	0.18 (.04)*	0.23 (.06)*
Household income	0.06 (.06)	0.05 (.06)	0.05 (.06)	0.06 (.06)	0.06 (.06)
Parental education	-0.09 (.06)	-0.10 (.06)	-0.10 (.06)	-0.09 (.06)	-0.09 (.06)
Violent community	0.13 (.11)	0.13 (.11)	0.12 (.11)	0.14 (.11)	0.14 (.11)
Witnessed violence	0.27 (.08)*	0.30 (.07)*	0.27 (.08)*	0.27 (.08)*	0.27 (.08)*
Delinquent friends	1.71 (.13)*	1.67 (.12)*	1.71 (.13)*	1.68 (.14)*	1.69 (.14)*
Black	0.66 (.27)	0.64 (.29)	0.67 (.29)	0.69 (.29)*	0.67 (.29)*
Hispanic	0.66 (.23)*	0.64 (.23)*	0.66 (.22)*	0.64 (.23)*	0.66 (.23)*
Other race	0.66 (.38)	0.66 (.37)	0.68 (.38)	0.69 (.37)	0.70 (.38)
Age	-0.10 (.05)	-0.09 (.05)	-0.09 (.05)	-0.09 (.05)	-0.09 (.05)
Male	1.04 (.17)*	1.02 (.17)*	1.00 (.16)*	1.03 (.17)*	1.04 (.17)*
Female-headed hshold	0.14 (.17)	0.10 (.17)	0.15 (.17)	0.12 (.17)	0.14 (.17)
Social support	-0.46 (.23)	-0.50 (.23)*	-0.45 (.24)	-0.44 (.24)	-0.44 (.24)
Children in household	0.11 (.16)	0.12 (.16)	0.13 (.16)	0.14 (.17)	0.15 (.17)
Early deviance	0.69 (.19)*	0.67 (.19)*	0.72 (.19)*	0.69 (.19)*	0.69 (.19)*
His. Abu. X Friends	-0.59 (.28)*				
Rec. Abu. X Friends		-1.13 (.38)*			
His. Vic. X Friends			-0.53 (.25)*		
Rec. Vic. X Friends				-0.21 (.24)	
Neg. events X Friends					-0.06 (0.05)
Constant	-3.18 (.86)*	-3.17 (.89)*	-3.15 (.88)*	-3.37 (.91)*	-2.92 (.89)
Log-likelihood	-1433.30	-1432.26	-1433.56	-1435.44	-1435.17

* p < .05 (two-tailed test)

To facilitate the interpretation of these interactions, the effects of strain are calculated at the minimum, the maximum, the mean, one standard deviation below the mean, and one standard deviation above the mean of the delinquent friends/peer pressure variable.[8] These data are presented in Table 3. Examining the effect of strain across the range of the delinquent peers/peer pressure variable indicates substantial variation in how exposure to strain influences adolescent delinquency. For example, a history of harsh physical punishment actually has a negative effect (-0.742) on the serious delinquency of adolescents who are exposed to the highest levels of delinquent friends/peer

pressure. The measures of recent abusive punishment and a history of victimization also indicate that strain reduces delinquency when the influence of delinquent friends is at its maximum. For each measure, the effect of strain becomes positive and increases in magnitude as the influence of delinquent friends/peer pressure decreases. For adolescents with an average amount of peer influence or less, the effect of strain is generally quite substantial. The findings in Tables 2 and 3, therefore, are inconsistent with Agnew's argument that exposure to delinquent friends/peer pressure will cause adolescents to be more vulnerable to strain. Instead, they indicate that exposure to criminogenic influences in one's environment, such as delinquent peers, results in adolescents who are *less vulnerable* to the effects of strain, providing support for the irrelevance hypothesis. In other words, youth with delinquent peers and exposure to peer pressure are less likely to choose deviant adaptations as a result of exposure to strain.

Table 3. Interpretation of Significant Interaction Effect Terms: Effects of Strain on Serious Delinquency at Selected Levels of Delinquent Friends*

Effect of a history of abusive punishment at various levels of delinquent friends:	
Delinquent friends maximum	-0.742
Delinquent friends mean + 1 *SD*	0.309
Delinquent friends mean	0.816
Delinquent friends mean – 1 *SD*	1.323
Delinquent friends minimum	1.388
Effect of recent abusive punishment at various levels of delinquent friends:	
Delinquent friends maximum	-1.833
Delinquent friends mean + 1 *SD*	0.177
Delinquent friends mean	1.148
Delinquent friends mean – 1 *SD*	2.119
Delinquent friends minimum	2.243
Effect of a history of victimization at various levels of delinquent friends:	
Delinquent friends maximum	-0.285
Delinquent friends mean + 1 *SD*	0.652
Delinquent friends mean	1.104
Delinquent friends mean – 1 *SD*	1.556
Delinquent friends minimum	1.614

* These effects are computed by adding the coefficient for the main effect of the strain measure to the product of the coefficient for the multiplicative term and various levels of delinquent friends.

In addition to the theoretical variables, two demographic variables maintain consistent, direct effects on serious delinquency: male and Hispanic. Not surprisingly, being involved in deviance at an early age consistently predicts later serious delinquency. Also, witnessing violence displays a consistent direct effect on violent delinquency, however a report of living in a "violent community", which would appear to be a similar measure, does not directly impact involvement in serious delinquency. This provides some evidence that vicarious strain might function similarly to experienced strain in their direct effects on delinquency. Finally, the proxy measures for direct controls (female-headed household and the number of children in the household) have no impact on serious delinquency in the multivariate models and the measure of social support is significant in only one of the five models.

Indirect Effects

Determining if the measure of delinquent friends/peer pressure conditions the *indirect* effect of strain requires two steps. First, I examine whether peer influence conditions the effect of strain on negative emotionality through the inclusion of product terms predicting the experience of negative emotionality. Second, I create a product term by multiplying peer influence by negative emotions to determine if the measure of delinquent friends/peer pressure conditions the effect of negative emotionality on serious delinquency. The results of the first step are presented in Table 4. All of the product terms representing the interactions between the five measures of strain and delinquent friends/peer pressure have a significant effect on negative emotionality. Moreover, all

five of these interaction terms are negative, which is consistent with the results for the direct effects of strain on delinquency. In other words, as exposure to delinquent friends/peer pressure increases, strain is less likely to increase the experience of negative emotionality among adolescents, again supporting the irrelevance hypothesis.

Table 4. Negative Binomial Regression Coefficients Representing the Conditioning Effect of Delinquent Friends on the Relationship between Strain and Negative Emotionality, With Relevant Controls

	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)
History of abuse	0.30 (.12)*	0.20 (.11)	0.21 (.11)	0.23 (.11)*	0.22 (.11)*
Recent abuse	0.49 (.15)*	0.76 (.15)*	0.47 (.15)*	0.51 (.15)*	0.51 (.14)*
His. of victimization	0.60 (.10)*	0.59 (.10)*	0.73 (.12)*	0.57 (.11)*	0.58 (.10)*
Recent victimization	0.42 (.09)*	0.41 (.09)*	0.40 (.09)*	0.67 (.11)*	0.49 (.09)*
Negative life events	0.20 (.02)*	0.20 (.02)*	0.20 (.02)*	0.21 (.02)*	0.25 (.02)*
Household income	0.00 (.02)	-0.00 (.02)	-0.00 (.02)	0.01 (.02)	0.01 (.02)
Parental education	0.08 (.03)*	0.08 (.03)*	0.08 (.03)*	0.07 (.03)*	0.08 (.03)*
Violent community	0.08 (.04)*	0.09 (.04)*	0.09 (.04)*	0.09 (.04)*	0.08 (.04)*
Witnessed violence	0.14 (.03)*	0.15 (.03)*	0.14 (.03)*	0.15 (.03)*	0.15 (.03)*
Delinquent friends	0.50 (.05)*	0.49 (.05)*	0.51 (.05)*	0.54 (.05)*	0.54 (.05)*
Black	-0.12 (.09)	-0.13 (.09)	-0.12 (.09)	-0.12 (.09)	-0.16 (.09)
Hispanic	-0.02 (.10)	-0.02 (.10)*	-0.02 (.10)	-0.03 (.10)	0.01 (.10)*
Other race	-0.03 (.13)	-0.03 (.13)	-0.02 (.13)	-0.05 (.14)	-0.04 (.13)
Age	0.07 (.02)*	0.07 (.02)*	0.07 (.02)	0.07 (.02)*	0.06 (.02)*
Male	-0.63 (.07)*	-0.63 (.07)*	-0.64 (.07)*	-0.63 (.07)*	-0.62 (.07)*
Female-headed household	-0.01 (.07)	-0.01 (.07)	-0.01 (.07)	-0.01 (.07)	0.00 (.07)
Social support	-0.19 (.11)	-0.19 (.11)	-0.19 (.11)	-0.20 (.11)	-0.20 (.11)
Children in household	-0.08 (.06)	-0.08 (.06)	-0.08 (.06)	-0.08 (.06)	-0.09 (.06)
Early deviance	0.06 (.09)	0.05 (.09)	0.08.(.09)	0.07 (.09)	0.08 (.09)
His. Abu. X Friends	-0.20 (.09)*				
Rec. Abu. X Friends		-0.50 (.14)*			
His. Vic. X Friends			-0.32 (.11)*		
Rec. Vic. X Friends				-0.46 (.09)*	
Neg. events X Friends					-0.15 (.02)*
Constant	-1.57 (.39)*	-1.59 (.39)*	-1.54 (.39)*	-1.66 (.39)*	-1.09 (.38)*
Log-likelihood	-5442.43	-5441.56	-5440.00	-5432.12	-5407.02

* $p < .05$ (two-tailed test)

Similar to the analysis of the direct effects, the effects of strain on negative emotionality are calculated at the minimum, the maximum, the mean, one standard deviation below the mean, and one standard deviation above the mean of the delinquent friends/peer pressure variable. These results are found in Table 5. Each measure of strain has a positive, significant main effect on negative emotionality. Each interaction term is negative, however, so the effect of strain decreases at higher levels of delinquent friends/peer pressure. As Table 5 shows, the strong, positive impact of strain on negative emotionality at low levels of delinquent friends/peer pressure actually becomes negative at the highest values of peer influence. Thus, consistent with the direct effects reported above, strain actually reduces negative outcomes for adolescents with the highest levels of exposure to delinquent friends /peer pressure. Again, this provides support for the irrelevance hypothesis, in that the presence of delinquent friends/peer pressure makes youth in the sample less

susceptible to negative emotionality, which is one component of the indirect effect of strain on delinquency according to GST.

In addition to the variables of theoretical interest, a number of control variables are related to negative emotionality in the models presented in Table 4. Males are less likely to report negative emotionality, but interestingly, age and parental education are positively related to negative emotionality. Also, whereas reports of living in a violent community were not directly related to serious delinquency, the models in Table 4 indicate that both this measure and reports of witnessing violence are positively related to negative emotionality. This provides further evidence that, within the framework of General Strain Theory, vicarious strains operate in a similar theoretical fashion to experienced strains. Neither the social control variables, nor the measure of social support, have a significant effect on negative emotionality.

Table 5. Interpretation of Interaction Effect Terms: Effects of Strain on Negative Emotionality at Selected Levels of Delinquent Friends

Effect of a history of abusive punishment at various levels of delinquent friends:	
Delinquent friends maximum	-0.215
Delinquent friends mean + 1 *SD*	0.133
Delinquent friends mean	0.302
Delinquent friends mean − 1 *SD*	0.471
Delinquent friends minimum	0.492
Effect of recent abusive punishment at various levels of delinquent friends:	
Delinquent friends maximum	-0.568
Delinquent friends mean + 1 *SD*	0.325
Delinquent friends mean	0.757
Delinquent friends mean − 1 *SD*	1.189
Delinquent friends minimum	1.244
Effect of a history of victimization at various levels of delinquent friends:	
Delinquent friends maximum	-0.115
Delinquent friends mean + 1 *SD*	0.455
Delinquent friends mean	0.730
Delinquent friends mean − 1 *SD*	1.005
Delinquent friends minimum	1.040
Effect of recent victimization at various levels of delinquent friends:	
Delinquent friends maximum	-0.552
Delinquent friends mean + 1 *SD*	0.271
Delinquent friends mean	0.668
Delinquent friends mean − 1 *SD*	1.065
Delinquent friends minimum	1.116
Effect of negative life events at various levels of delinquent friends:	
Delinquent friends maximum	-0.141
Delinquent friends mean + 1 *SD*	0.121
Delinquent friends mean	0.247
Delinquent friends mean − 1 *SD*	0.373
Delinquent friends minimum	0.390

The final step of determining the conditioning effect of delinquent friends/peer pressure on the indirect effect of strain on serious delinquency is to examine whether the effect of negative emotionality on delinquency varies across levels of exposure to peer influence. The negative binomial regression model testing this research question is presented in Table 6. In this model, we see that both negative emotionality and delinquent friends/peer pressure have positive main effects on delinquency ($\beta = 0.110$ and $\beta = 1.655$, respectively), while the interaction term is again negative ($\beta = -0.051$). Thus, the effect of negative emotionality on delinquency decreases as exposure to delinquent friends/peer pressure increases. Table 7 presents the effects of negative emotionality on delinquency calculated at five levels of exposure to delinquent friends/peer pressure. Again providing support for the irrelevance hypothesis, this second component of the indirect effect of strain on delinquency, the impact of negative emotionality on delinquency, appears similar to the other interaction effects examined thus far. At the highest level of exposure to delinquent friends/peer pressure, the effect of negative emotionality is slightly negative. As the influence of delinquent friends/peer pressure decreases, however, the effect of negative emotionality on serious delinquency becomes positive.

Table 6. Negative Binomial Regression Coefficients Representing the Conditioning Effect of Delinquent Friends on the Relationship between Negative Emotionality and Serious Delinquency, With Relevant Controls

	Coefficient	S.E.
History of abuse	0.311	0.313
Recent abuse	0.254	0.489
His. of victimization	0.564*	0.225
Recent victimization	1.078*	0.216
Negative life events	0.150*	0.042
Negative emotionality	0.110*	0.031
Household income	0.048	0.058
Parental education	-0.094	0.055
Violent community	0.124	0.111
Witnessed violence	0.248*	0.079
Delinquent friends	1.655*	0.136
Black	0.670*	0.305
Hispanic	0.682*	0.222
Other race	0.765*	0.390
Age	-0.080	0.051
Male	1.155*	0.166
Female-headed household	0.183	0.171
Social support	-0.412	0.244
Children in household	0.147	0.174
Early deviance	0.654*	0.188
Negative Emot. X Del. friends	-0.051*	0.025
Constant	-3.390*	0.897
Log-likelihood	-1428.85, $p < 0.000$	

* $p < .05$ (two-tailed test)

Table 7. Interpretation of Interaction Effect Terms: Effects of Negative Emotionality on Serious Delinquency at Selected Levels of Delinquent Friends

Effect of negative emotionality at various levels of delinquent friends:	
Delinquent friends maximum	-0.025
Delinquent friends mean + 1 *SD*	0.066
Delinquent friends mean	0.110
Delinquent friends mean – 1 *SD*	0.154
Delinquent friends minimum	0.159

Another interesting finding from the model in Table 6 is that the inclusion of negative emotionality and the interaction term between negative emotionality and delinquent friends/peer pressure mediates the impact of the physically abusive punishment, but not the impact of the victimization variables, on serious delinquency. The primary difference between these variables is that the former are related to the context of familial punishment, whereas the latter refer to more general types of victimization. Consequently, the relationship between physically abusive punishment and serious delinquency appears to be primarily a result of the impact of physically abusive punishment on heightened feelings of negative emotionality. Additionally, none of the race variables has a consistent significant direct impact on serious delinquency in the models in Table 4, however, when negative emotionality is added to the model in Table 6, all three racial categories have positive, significant regression coefficients, suggesting a suppression effect was present. In this case, negative emotionality serves as an "unsuppressor" (Thompson and Levine 1997), suggesting that potentially interesting theoretical connections exist between strain, negative emotionality, race, and serious delinquency.

DISCUSSION AND CONCLUSION

Implications for Anomie/Strain Theory

A primary goal of this research is to address the ability of anomie/strain theories to predict how adolescents will react to strain. Specifically, I am addressing the question of why some strained adolescents choose deviant adaptations, while other strained youth avoid criminal involvement. I argue that differential exposure to criminogenic influences in the social environments of adolescents will alter the way that they react to negative stimuli. I focus on exposure to delinquent friends as a factor that might condition the direct and indirect effects of strain on serious delinquency.

Testing interaction effects through the inclusion of product terms in negative binomial regression models on a nationally representative sample of adolescents, I find a consistent, negative interaction between strain and exposure to delinquent friends. Interpreting these coefficients in relation to general strain theory, these findings indicate that strain has a strong, positive impact on involvement in serious delinquency for adolescents with few delinquent friends. As exposure to delinquent friends increases, the presence of strain such as harsh physical punishment or victimization becomes less salient. While previous research in this area has produced mixed results, these findings are consistent with those of Hoffmann and Miller (1998), Aseltine et al. (2000), and Harrell (2007) in support of the *irrelevance hypothesis*, stating that the impact of strain becomes irrelevant for adolescents exposed to delinquent friends involved in high levels of delinquency and exposed to high levels of peer pressure to commit delinquency. Moreover, the current findings extend our knowledge of this theoretical process by confirming that the irrelevance hypothesis is applicable to not only the direct relationship between strain and delinquency but also the indirect relationship via negative emotions.

These findings are not supportive of Agnew's (1992) prediction that adolescents facing exposure to delinquent peers and peer pressure will be more likely to respond to strain with delinquency than youth that are insulated from these peer influences. In what I refer to as the *vulnerability hypothesis,* Agnew suggests that adolescents with delinquent friends are more likely to adopt delinquent forms of coping with strain because these associates can serve as delinquent role models that instill delinquent values (Agnew 1999; Agnew and White 1992; Aseltine et al. 2000) or provide additional opportunities for delinquency (Agnew and White 1992; Warr 2002). The current research, as well as the research of Hoffmann and Miller (1998), Aseltine et al. (2000), and Harrell (2007), suggests that the vulnerability hypothesis is not invariant. Rather, future research on general strain theory should attempt to specify contextual conditions that facilitate

vulnerability to strain versus contextual conditions that tend to make exposure to strain irrelevant as a cause of delinquency. The research of Spohn and Kurtz (2011) regarding the influence of family structure on perceptions of "just" or "unjust" strain is one step in this direction.

In addition to the implications for the vulnerability versus irrelevance hypotheses, this research provides broader insights for the anomie/strain theories developed by Merton (1938), Cohen (1955), Cloward and Ohlin (1960), and Agnew (1985; 1992; 2001; 2006). In developing his anomie theory, Merton (1938) did not have access to the information that modern criminologists have garnered from self-report data. Consequently, Merton's insights were based on available evidence from official crime statistics that have historically produced a strong, negative relationship between social class and delinquency. Thus, Merton argued that anomie, viewed as the gap between cultural expectations and the social structural means of achieving these culturally prescribed expectations, was predominantly a curse of the lower social classes, and his theory does not contain predictions for the impact of strain for middle-class or upper-class youth. Neither did Merton acknowledge the strong relationship between the delinquency of adolescents and the delinquent involvement of their peers and friends, even though Shaw and McKay (1931) and other criminologists were making these claims as early as the 1920s.[9] Merton's neglect of the group nature of delinquency was an impetus for the work of subsequent strain theorists such as Cohen (1955) and Cloward and Ohlin (1960).

Cohen's theory advanced beyond Merton in two significant ways. First, it was an attempt to make strain/anomie theories more applicable to adolescents by focusing on strain that lower/working-class youth face in the educational setting. Thus, rather than focusing on unachieved or unachievable economic goals, Cohen (1955) argues that working-class youth will face strain as they fail to live up to the middle-class expectations they face in school. Second, Cohen acknowledges that peers play an integral role in the etiology and maintenance of delinquent activities. His theory is a bit simplistic, though, because he sees the influence of strain and peers as separate stages in the development of a criminal career. First, working-class adolescents are strained in the educational setting when they fail to meet middle-class achievement standards. This strain leads to a "reaction formation" in which youth reject middle-class values and, instead, adopt "their very antithesis" (Cohen 1955: 129). These strained youth join a delinquent subculture composed of youth who can achieve status through the rejection of middle-class goals and the commission of delinquent (often violent and non-instrumental) acts. In summary, strain pushes youth into the delinquent subculture, and the delinquent subculture perpetuates delinquency. Cohen neglects the possibility that strained youth might not have delinquent friends or that adolescents with delinquent friends might be

immersed in a "delinquent subculture" for reasons other than exposure to strain.

Although my findings cannot speak to the time ordering between strain and involvement with delinquent peers, they clarify the role of strain in the presence and absence of delinquent friends. Interpersonal strain is very salient for youth whose exposure to delinquent friends and peer pressure to commit delinquency is low, but strain is relatively unimportant for youth whose exposure to delinquent friends and peer pressure is high, the functional equivalent of Cohen's "delinquent subculture." In addition to this clarification, my results address one of Kornhauser's (1978) major critiques of Cohen. Because Cohen admits that delinquency would not be available as an adaptation to strain if it were not "socially legitimized and given a kind of respectability" by the tenets of the delinquent subculture, Kornhauser concludes that strain theory cannot explain delinquency without relying on an additional theoretical model (i.e. cultural deviance theory) (1978:152). My results show that Kornhauser's insights might indeed be applicable to youth with many delinquent friends. Strain does not seem to increase the delinquent involvement of youth in this subgroup. My finding that strain has a strong, positive impact on adolescents who are not influenced by delinquent friends, however, shows that both Cohen and Kornhauser underestimated the role of strain in producing delinquency.

Conclusion

The current research project is an examination of how the presence or absence of delinquent friends and peer pressure conditions the relationship between strain and serious delinquency. This specific empirical relationship addresses the larger theoretical question of whether the adolescents' social context influences their choice of deviant or conventional adaptations when confronted with negative stimuli such as harsh punishment or victimization. A goal of this research is to reach a better understanding of whether a criminogenic social environment causes adolescents to become more or less vulnerable to the effects of strain. The null hypothesis is that social influences, such as delinquent friends, have no impact on the way that youth react to stressful events.

The empirical models provide consistent support for the irrelevance hypothesis, stating that adolescents with friends who commit high levels of delinquency and friends who exert peer pressure to commit delinquency are less vulnerable to the effects of strain than youth with less exposure to delinquent friends and delinquency-related peer pressure. Put simply, in the presence of high levels of delinquent peers and peer pressure, strain is less likely to cause deviant adaptations to strain. In this situation, strain is less likely to produce negative emotionality which, in turn, is less likely to result in delinquency. Although these

findings contradict some of the existing empirical literature, at least three research projects have produced similar findings regarding direct effects of strain on delinquency (Aseltine et al. 200; Harrell 2007; Hoffmann and Miller 1998). Moreover, the findings are compatible with previous criminological research addressing the relative importance of parental attachments (an important variable from social control theory) and delinquent peers (a central concern of social learning/differential association theories). Regarding this topic, Warr (1993) found that parental attachment played an important role in preventing delinquency for youth with few delinquent friends. If the individual was enmeshed in a network of delinquent peers, however, attachment to parents played little role in reducing criminal activities. Because delinquent friends play a significant role in the etiology of delinquency, criminologists must take the role of peer influences into account in order to correctly specify the role of strain in producing deviant adaptations.

Limitations of the research should be noted. Due to data considerations, the empirical analysis is limited to the prediction of serious index offenses and the findings may not necessarily be generalized to less serious forms of delinquency. Also, my focus is on strain in the form of negative stimuli, but it does not include other forms of strain deemed important by Agnew or other strain theorists. Finally, the data, although nationally representative, do not allow for longitudinal analysis.

The research suggests several avenues for future research. A logical next step in this research agenda is to test these hypotheses using longitudinal data. Also, as suggested by an acute reviewer of this manuscript, analysis of data-sets that include social network data has the potential to further specify the conditional effect of peer influence on the theoretical linkages of strain theories. Another reviewer-suggested avenue for future research is an examination of the conditioning impact of peer-influence on the relationship between experiences of vicarious strain and involvement in delinquency. The current findings suggest that at least some measures of "vicarious strain" operate in a similar fashion to "experienced strain" in the multivariate models. Further specification of the impact of a variety of types of strain will only strengthen our understanding of the role of strain theories in delinquency causation. Just as important is the further specification of aspects of youths' environmental context that produce vulnerability or resilience to strain exposure.

Endnotes

[1] This lively debate arose between control theorists such as Travis Hirschi in his *Causes of Delinquency* (1969) and differential association and social learning theorists such as Edwin Sutherland and Ronald Akers. A review of

the central theoretical and empirical issues may be found in Matsueda (1982).

[2] A full description of all variables used in the multivariate analyses is available from the author upon request.

[3] Symptom counts, rather than a diagnostic criteria (present/absence of disorder), are adopted for this study for both methodological and theoretical reasons. Methodologically, adopting a count of symptoms as a measure of negative emotionality, as opposed to a yes/no diagnosis of PTSD, prevents the loss of a considerable amount of information that is available in the data. Theoretically, general strain theory predicts that higher levels of negative emotionality should increase participation in delinquent acts, but does not specify that a diagnosable disorder is the "tipping point" that will push adolescents into deviant adaptations. For both of these reasons, symptom counts are adopted as the measure of negative emotionality for this study.

[4] A few individuals reported excessively high numbers of instances of being involved in gang fighting, in some cases almost once per day. Due to these few outliers, the dependent variable was truncated at 100 instances of serious delinquency per year. This truncation did not influence the substantive findings.

[5] Although Agnew does identify experiences such as witnessing violence or being exposed to a violent community as forms of "vicarious strain" in later incarnations of his General Strain Theory, I believe that there are theoretical reasons for maintaining a focus on "experienced strains" and treating vicarious strains as control variables in this analysis. In making his distinction, Agnew refers to vicarious strains as "strains experienced by others around individuals, especially close others like family members and friends" and experienced strains as disliked events or conditions that were personally experienced (2006:10). Agnew (2006) argues that personally experienced strain should bear the strongest relationship to crime and delinquency, so I suggest that the strongest theoretical argument can be made by focusing on experienced strains. Youths' reactions to negative events experienced by others involves matters of affect, sympathy, and empathy that are unmeasured in the current data-set and are beyond the theoretical scope of the current research. Consequently, I suggest that the processes examined in this paper would not necessarily lend themselves to explaining reactions to vicarious strain.

[6] Parents of the adolescents were also asked this question on violence in the community. The response of the parent was substituted for the 28 adolescents whose response was "don't know."

[7] The Stata statistical package provides a straightforward test for overdispersion. A likelihood ratio test is produced to test the null hypothesis that the dispersion parameter, alpha, is equal to zero. If the null hypothesis is not rejected, equidispersion is assumed and basic Poisson models are appropriate. If the null hypothesis is rejected, overdispersion is present in the data and negative binomial models should be used (Statacorp, 2001). In a full model examining the effect of strain, negative emotionality, and control variables on serious delinquency, Stata produces a value for alpha =3.869. The corresponding χ^2 value of 2,826.10 is highly significant ($p < 0.000$), indicating that the data are not Poisson, and that negative binomial models are more appropriate. Because "negative emotionality" is a dependent variable when indirect effects are examined, I ran a similar model with the count of negative emotions as the dependent variable. For this model, alpha = 1.396, with a corresponding χ^2 value of 2938.40 ($p < 0.000$). Again, the null hypothesis that alpha equals zero should be rejected and negative binomial models should be used.

[8] These effects are computed by adding the coefficient for the main effect of the strain measure to the product of the coefficient for the multiplicative term and various levels of delinquent friends. For example, Table 3 presents the value of the interaction term between a history of abusive punishment and the maximum value of delinquent friends as β = -0.742. The variable representing delinquent friends/peer pressure was logged to reduce skewness. The relevant descriptive statistics for the logged variable are: mean = 0.97, standard deviation = 0.86, minimum value = -0 and maximum value = 3.61. The variable was then centered to facilitate the interpretation of the interaction effect and to reduce multicollinearity. The relevant descriptive statistics for the logged, centered variable are: mean = 0, standard deviation = 0.86, minimum value = -0.97 and maximum value = 2.64. To calculate the value of the interaction term between a history of abusive punishment and the maximum value of delinquent friends, we add the mean effect of a history of abusive punishment to the product of the interaction coefficient (-.059) and the maximum value of the logged, centered delinquent friends variable (2.64), resulting in: β = 0.816 + (-0.59)(2.64) = -0.742.

[9] For an excellent review of the history of research on delinquency as group behavior see Warr (2002).

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APPENDIX: DESCRIPTION OF SCALE COMPONENTS

Life Events Stress Scale   (alpha = 0.550)
Which of these events happened to you during the last year? Coding: Yes = 1, No = 0

- Serious illness or injury of a family member
- Mother/father lost a job
- Death of a family member
- Death of a close friend
- Serious illness or injury of a close friend
- Losing a close friend
- Having to repeat a school grade
- Major personal illness or injury
- Being suspended from school
- Getting at least one failing grade on a report card

Negative Emotionality
Within the last 6 months, have you:
- Had trouble concentrating or keeping your mind on what you were doing, even when you tried to concentrate?
- Lost interest in activities which usually meant a lot to you?
- Felt you had to stay on guard much of the time?
- Deliberately tried very hard not to think about something that had happened to you?
- Had difficulty falling asleep or staying asleep?
- Stopped caring about activities in your life that used to be important to you?
- Unexpected noises startled you more than usual?
- Kept having unpleasant memories, or seeing them in your mind?
- Had repeated bad dreams or nightmares
- Went out of your way to avoid certain places or activities which might remind you of something that happened to you in the past
- Deliberately tried to avoid having any feelings about something that happened to you in the past?
- Felt cut off from other people or found it difficult to feel close to people?
- Could not feel things anymore or that you had much less emotion than you used to?
- Found yourself suddenly feeling very anxious, fearful, or panicky?
- Little things bothered you a lot or could make you very angry?
- Had disturbing memories that kept coming into your mind whether you wanted to think of them or not?
- Felt a lot worse when you were in a situation that reminded you of something that had happened in the past?
- Found yourself reacting physically to things that reminded you of something that had happened in the past?
- The way you think about or plan for the future was changed by something that happened to you in the past?
- Had a "flashback" – that is, have you had an experience in which you imagined that something that happened in the past was happening all over again?

Delinquent Friends. Variable used in the analysis is the product of components A and B.

Component A:
Have your friends ever: 0 = *no*; 1 = *yes*

- Purposely damaged or destroyed property that did not belong to them?
- Used marijuana or hashish?
- Stolen something worth less than $5?
- Hit or threatened to hit someone without any reason?
- Broken into a vehicle or a building to steal something?
- Sold hard drugs such as heroin, cocaine, and LSD?
- Stolen something worth more than $50?
- Gotten drunk once in awhile?
- Sold or given alcohol to kids under 18?

Component B:
Have your friends ever suggested you do something that was against the law?

- None of them or very few of them = 1
- Some of them = 2
- Most of them = 3
- All of them = 4

Parent's Education
What is the highest grade or year of school that (you/head of household) completed?

- No formal schooling   = 1
- First through 7th grade   = 2
- 8th grade   = 3
- Some high school   = 4
- High school graduate   = 5
- Some college   = 6
- Four year college grad.   = 7
- Some graduate school   = 8
- Graduate degree   = 9

Income (from parent questionnaire)
Before taxes and other payroll deductions, would you say that the total 1994 income of all members of your household was:

- Less than $5,000   = 1
- $5,000 to $10,000   = 2
- $10,000 to $20,000   = 3
- $20,000 to $30,000   = 4
- $30,000 to $40,000   = 5
- $40,000 to $50,000   = 6
- $50,000 to $75,000   = 7
- $75,000 to $100,000   = 8
- More than $100,000   = 9

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Drunk Driving in the United States: An Examination of Informal and Formal Factors to Explain Variation in DUI Enforcement across U.S. Counties

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Abstract: *This research aims to understand how informal non-legal factors, such as normative climates, and formal legal factors, such as open-container laws, seat-belt laws, and police force strength are related to variation in drunk driving (DUI) enforcement across U.S. counties. In particular, this study focuses on explaining whether differences in the macro-level normative climates toward drinking (i.e., anti-drinking normative climates and pro-drinking normative climates) are related to levels of DUI enforcement by police. It is unclear whether informal factors exert effects on DUI enforcement, independent of formal legal factors. This study takes a population-based approach and uses cross-sectional information (1999-2001) compiled from a variety of official agencies that disseminate county-level data. Results from Exploratory Spatial Data Analysis (ESDA) and Spatial Regression Analyses suggest that areas with anti-drinking normative climates are associated with higher levels of DUI enforcement. Conversely, areas with pro-drinking normative climates tend to be associated with lower levels of DUI enforcement. Overall, these findings suggest that normative climates toward drinking account for some of the variation in rates of DUI enforcement, independent of formal legal factors. Limitations and implications for DUI control and future research are discussed.*

Keywords: arrest rates, counties, drunk driving, DUI, normative climates

INTRODUCTION

Effective control of drunk driving (DUI) is a priority of interest groups, public health officials, policy makers, and law enforcement agencies in the United States. Efforts to control DUI generally rely on a deterrence model—that lower rates of DUI are associated with increased formal sanctions and increased certainty of arrest (Jacobs 1989; Ross 1992). However, macro-level informal factors, which are not part of the formal legal system, may also be related to levels of DUI enforcement in an area. Drunk driving varies considerably across the United States, but the factors that account for differences in DUI enforcement by police remain unclear. While a large body of empirical

research has examined how formal legal factors, such as DUI laws, are related to variation in DUI behavior (e.g., DeJong and Hingson 1998), much less research has focused on understanding how informal norms may account for variation in DUI enforcement across geographical areas.

Informal social norms are fundamental to social organization and human behavior; norms provide informal rules about how people "ought" to behave (Homans 1961). The informal rules, values, and beliefs regarding alcohol consumption are different among groups and across areas of the U.S. In some areas, drinking alcohol is acceptable and normative behavior, whereas in other areas, there is a strong normative climate that severely regulates acceptable

drinking. While it is well established that community political and social climates influence police practice (Wilson 1968) and departmental contexts shape police behavior (Mastrofski, Ritti, and Hoffmaster 1987), it is unclear whether police enforcement of DUI varies in relation to macro-level normative climates toward drinking.

In contrast to informal factors, the formal legal system features a number of laws, policies, ordinances, and police practices to control drunk driving. However, these laws are not applied equally across areas of the U.S. and they are not equally enforced. For example, several states have laws permitting roadside sobriety checkpoints, but even though checkpoints are legal, there is within-state variation in the frequency in which they are conducted by police. Although DUI-control laws in some areas are associated with lower rates of drunk driving, the extent to which area-wide informal norms exerts effects independent of formal laws has not been established in previous research.

The overarching goal of this research is to explain differences in drunk driving across areas and to understand why some places experience higher levels of DUI enforcement than others. Toward this goal, this study examines how informal factors, such as normative climates toward drinking, and formal laws are related to variation in enforcement. In particular, focus is directed toward understanding whether differences in macro-level pro-drinking norms and anti-drinking norms are associated with levels of DUI enforcement and whether these informal factors exert effects independent of formal laws. To avoid inference of lower-level processes based on aggregate data, this study focuses on understanding macro-level factors that potentially account for macro-level variation or differences across aggregate units (i.e., counties).

BACKGROUND

Area-Wide Normative Climates

Norms are embedded cultural forces that provide rules about how people "ought" to behave—they prescribe, proscribe, and regulate social behavior (Hechter and Opp 2001; Homans 1961:12; Horne 2001). Sociologists have long argued that people take into account cultural and normative standards in deciding their own actions, and that the prevailing normative climate of an area can encourage or discourage types of behavior (Anderson 1999; Butler 2002; Jenks and Mayer 1990; Lee et al. 2007).

Alcohol is a feature of American culture, and groups in some areas define drinking as unacceptable while in other areas, drinking is acceptable, if not encouraged behavior. These general rules about alcohol consumption, including social prescriptions about acceptable usage (e.g., amount, type of beverage, time of day, place, social setting), are powerful cultural forces (Felson et al. 2011;

Linsky et al. 1987; Room and Makela 2000). Thus, the widely held rules regarding alcohol create a framework from which group members and non-members evaluate themselves and their behavior, forming the basis of the normative climate in which they are enmeshed. For example, an observer of the French Quarter in New Orleans, Louisiana, the Las Vegas Strip, Nevada, or a major college town is likely to be aware of a normative climate where drinking is acceptable—just as a visitor to parts of Utah or areas of the South would experience a normative climate against drinking alcohol. The normative climate toward drinking is pervasive and one would be hard-pressed to ignore symbols regarding the cultural position of alcohol. In this way, the standards held by some groups can become a part of the normative system regulating social behavior, which is experienced by group members and non-members, including police.

It is well understood in criminological research and theory that arrest rates are in part a reflection of actual offending behavior and in part a reflection of arrest policies, policing strategies, and more generally, the behavior of social control agents (Black 1970; Mosher, Miethe, and Hart 2011; O'Brien 1996; Schwartz and Rookey 2008; Sutherland 1947). The seminal work of Wilson (1968) describes how police behavior is influenced by the relationship between the community political climate and the organizational characteristics and policies of the police department. For example, officers in a particular department may be expected to differentially enforce laws that are seen as important by community members and local officials but deemphasize enforcement of other types of criminal behavior, such as traffic violations (Wilson, 1968). Since detecting and arresting drunk drivers is a proactive and resource dependent policing practice, law enforcement agencies are likely to enforce DUI laws in response to community norms (Black 1970; Jacobs 1989). In areas where there is a strong normative climate against drinking, police agencies may use discretionary resources to engage in proactive practices to make DUI arrests. However, in other areas, police may be more tolerant of alcohol-related behaviors and reprioritize proactive policing efforts away from DUI patrols resulting in lower DUI arrest rates.

Religious groups and normative climates against drinking. Religion is a "bedrock institution" (Peterson, Krivo and Harris 2000), and religious culture is an important part of social life. The "moral communities" thesis (Stark, Kent, and Doyle 1982) suggests that rates of law breaking behavior will be *lower* where larger proportions of the population are actively religious (Lee 2006). According to this perspective, the widespread adherence to religion-based moral values in an area deter potential offenders from engaging in criminal (i.e., immoral) behavior (Lee 2006). Stark (1996) notes that this relationship can only be observed where populations are immersed in an area-wide environment of open religious

adherence and participation because the religious moral standards held by groups "enter into everyday interactions and become a valid part of the normative system" (Stark 1996:164).

Based on these insights, it is expected that the greater presence of certain religious groups, such as those who have strong moral commitments against drinking, is related to variation in levels of DUI enforcement by police. Religious affiliation is related to preferences toward alcohol consumption and alcohol restrictions (Chaloupka, Saffer, and Grossman 1993; Coate and Grossman 1988), and several religious groups have strong norms against alcohol consumption (e.g., Southern Baptists, Latter Day Saints, Evangelicals, and Seventh Day Adventists) (Nelson et al. 2004). The greater density of groups with strong "anti-drinking" norms in an area contributes to the moral climate that defines normative behavior, such as drinking. Since previous research suggests that these relationships may be limited to certain regions of the U.S. (Ellison, Burr, and McCall 2003; Lee 2006; Stark 1996), statistical controls for "South" and "rurality" are included in this analysis.

Widespread adherence to religion-based moral values concerning drinking may deter DUI behavior, but the enforcement of DUI laws may be increased because police are responsible for upholding the moral standards of the community in which they are members. Since detecting and arresting drunk drivers is a proactive and resource dependent policing practice (Black 1970; Jacobs 1989), law enforcement agencies operating in areas with strong proscriptive normative climates could be more likely to enforce DUI laws in response to community pressure for police action. Thus, it expected that in areas with normative climates against drinking, DUI enforcement will be greater, accounting for levels of DUI behavior and police force strength.

College campus areas and pro-drinking normative climates. The informal rules, values, and beliefs governing the use of alcohol are different among young adults compared to older age groups. Drinking alcohol marks a transition from youth to adulthood (Jacobs 1989) and drinking among young adults is a very common social practice (Harford, Wechsler and Seibring 2002). Studies show that about 40 percent of college-aged students are binge drinkers (Kuo et al. 2003; Wechsler et al. 2002), which is usually defined as heavy episodic alcohol consumption of at least five drinks in a row for men or four drinks in a row for women. While drinking appears to be more common among young adults, particularly young adult males (Roebuck and Murty 1996), there is considerable agreement in the empirical literature that young men and women comprise a disproportionate share of drunk drivers. Young adults are more likely than older age groups to self-report, get arrested for, or fatally injure someone while driving drunk (Mayhew et al. 2003; Schwartz and Rookey 2008; Zador, Krawchik, and Voas

2000). Even though increased drinking behavior and DUI behavior among young adults is expected to be related to greater DUI arrest rates, it is also likely that police enforcement of DUI laws vary in relation to the presence of a college campus.

College and university campuses are not only unique places that promote education, entertainment, and "college culture," but may also contribute to the climate that defines normative behaviors, such as drinking. Not only is drinking acceptable in a majority of these areas, but college campuses can provide the area with a wide range of resources and space for social interactions in which drinking norms are defined and redefined.

A large body of research shows higher rates of binge drinking and higher rates of alcohol consumption among college students (Hingson et al. 2002; Wechsler et al. 2002). Among a majority of college students, moderate drinking is a normative behavior (Presley, Meilman, and Lyerla 1995) and heavy drinking is common for certain subgroups of college students (i.e., sororities and fraternities) engaged in a "party subculture" (Hagan 1991). Pro-drinking attitudes compounded by the party subculture of college campuses may be associated with pro-drinking norms not only among students, but to the area as well (Ahern et al. 2008). A range of services and businesses that serve and support drinkers, including bars and liquor stores (Kuo et al. 2003), usually accompany campus areas. In this sense, the structural and cultural aspects of college campuses support pro-drinking norms.

Colleges and universities also provide social and cultural capital to larger areas. The normative component to supporting a nearby college or university reaches beyond local campuses into neighboring communities and the region. Specific contexts and events (e.g., football games) that promote drinking and help maintain pro-drinking norms are common at colleges and universities (Oster-Aaland and Neighbors 2007). These types of events amplify social interactions among groups within campus areas and from outside the campus (Neighbors et al. 2006). When groups come together in campus areas, normative interactions are more likely to take place among community members, students, and alumni at specific places including tailgating areas (Oster-Aaland and Neighbors 2007), local bars or taverns, or private parties, all of which protect pro-drinking norms.

Based on these aspects, the presence of a college campus contributes to the normative climate that defines normative behavior. Inasmuch as drinking is defined as acceptable behavior in these areas; we would expect areas with a major college campus to be associated with higher levels of drinking and perhaps drunk driving. However, police (including city, county, state, and campus) may be more tolerant of alcohol-related behaviors (e.g., fistfights, public intoxication, drunk driving) in these areas. Controlling for the proportion of young adults, DUI behavior, and police force strength, lower levels of police

enforcement of DUI laws may be observed in areas with pro-drinking normative climates, as measured by the presence of a major college campus.

Formal Legal Factors

Although driving a vehicle while intoxicated has long been against the law, the social definition of drunk driving has changed, and many groups (e.g., Mothers Against Drunk Driving) consider drunk driving to be morally reprehensible (Jacobs 1989; Ross 1992; Reinarman 1988). In contrast to norms against drinking, there are mores, or formal rules, against drunk driving that also involve the moral standards of society. When norms are made into laws, legal sanctions are imposed by the state, which is responsible for enforcement of these rules through the legal system and the police (Horne 2000).

The formal legal system features many laws, ordinances, and police practices aimed at reducing and deterring drunk driving. For example, general deterrence policies have involved increased sanctioning following DUI arrests through administrative license revocation, mandatory jail time (Ross 1992; Voas 1986), and increased fines (Jacobs 1989; Ross and Voas 1989), as well as efforts to increase the perceived certainty of arrest through roadside sobriety checkpoints and DUI saturation patrols. Other state-imposed DUI countermeasures have included laws against drinking alcohol in a vehicle (i.e., open-container laws) and efforts to reduce the geographical availability of alcohol. There is a large body of research describing a wide variety of formal DUI laws (see Jacobs 1989) and their effectiveness (see Eisenberg 2003). These formal factors are in place because drunk driving remains a problem that informal factors have been unsuccessful in eliminating.

Three important policies effectively increase the ability of police to detect drivers under the influence of alcohol. First, the primary enforcement of seat belt laws authorizes police to initiate a traffic stop and issue a citation if an occupant is observed traveling unbelted in a motor vehicle (Houston and Richardson 2006). This gives police greater purview to detect alcohol-impairment among drivers who would not otherwise encounter police. Second, open-container laws were established to prohibit possession and consumption of alcoholic beverages in the passenger areas of a motor vehicle (NHTSA 2004). While drinking alcohol in a vehicle does not necessarily indicate intoxicated driving, open container laws provide another avenue for police to detect drunk drivers. Third, the strength of the police force increases the possibility of a criminal event, like drunk driving, leading to an arrest (Mosher 2001). Police have responded to the cultural redefinition of drunk driving by prioritizing DUI enforcement (Jacobs 1989; Ross 1992; Schwartz and Rookey 2008) and engaging in proactive policing strategies (Ross 1992). Proactive policing is directly correlated with the allocation of police staff resources (Black 1970).

Laws and the legal system can compensate for the inadequacies of informal control (Schwartz 1954) but the legal system of formal controls also affects the informal enforcement of social rules (Posner 1996). Horne (2000) finds that the presence of a strong legal system may inhibit the effectiveness of informal sanctioning and deteriorate group interactions that provide the basis of informal social control. While the present research cannot address informal social control per se, it is important to understand whether macro-level normative climates toward drinking exert effects on drunk driving independent of formal laws and rules administered by the government through the legal system. Based on previous research, formal factors—particularly those related to increasing police ability to detect drunk driving—are expected to be related to variation in DUI enforcement. It may be that formal legal policies mitigate any observed association between informal factors and DUI enforcement, but it is important to understand whether this is the case.

DATA AND METHODS

Examining the extent that informal and formal factors account for variation in drunk driving enforcement requires data on DUI arrests, DUI behavior, police force strength, religious adherents, college campuses, age structure, rurality, and several formal laws. Because of the data required, counties are used as units of analysis. While there are noted disadvantages associated with county-level information and analysis, a main benefit is that a wide array of data is available on counties but not for other units of analysis such as cities, and neighborhoods. (Lee 2006). Unlike neighborhoods or communities, counties encompass the entire contiguous U.S. and allow the complete range of social landscapes to be examined (Nielsen and Alderson 1997). In addition, the social processes related to normative systems and the formal control of drunk driving are embedded in counties. Counties are not just population containers, but instead are important spaces where area wide social processes occur. Local governmental systems (i.e., jails, courts, public health resources) and some police agencies (i.e., county sheriff) operate at the county-level and many state economic, environmental, health, and social programs and are delivered through county-based offices (Lobao, Hooks, and Tickamyer 2007).

This study analyzes a cross-sectional dataset derived from several official sources including the Federal Bureau of Investigation (Uniform Crime Reporting Program), The Association of Religion Data Archives (TheARDA), Integrated Postsecondary Educational Data System (IPEDS), National Highway Traffic Safety Administration (Fatality Analysis Reporting System), Expenditure and Employment Data for the Criminal Justice System (CJEE),

Insurance Institute for Highway Safety, the Alcohol Policy Information System (APIS) (NIAAA 2007b), U.S. Department of Agriculture, and U.S. Census.

Dependent Variable

The measure of DUI enforcement is based on arrest statistics for driving under the influence (DUI) obtained from the Uniform Crime Reporting Program (UCR), which is disseminated by the Federal Bureau of Investigation (FBI 1999-2001). Because in any particular year a proportion of U.S. counties experience few DUI arrests, this variable is averaged over 3 years (1999-2001). The FBI compiles annual arrest data from monthly reports submitted by over 17,000 law enforcement agencies. DUI arrests in each county are expressed as a rate per 100,000 county population covered by agencies reporting arrests to the FBI including city police, county sheriffs and college

campus police. DUI arrests made by state agencies in Vermont, Connecticut, and New Jersey were not allocated to counties in the original UCR data files. To include this information, arrests made by state agencies (e.g., highway patrol, state police) were allocated to each county based on county share of the state population. This method of adjusting for arrests by state police could yield more conservative results in population-based models. The "coverage indicator" variable provided in the UCR program data was used to identify counties where police agencies did not report DUI arrests (missing data) and counties where a "true zero" count of DUI arrests could be assigned (see Lynch and Jarvis 2008). Agencies in two states (Illinois and Florida) did not report DUI arrests to the FBI in the period and were excluded from this study.

Table 1. Variable Descriptions

Variable	Description	Mean	S.D.
DUI enforcement	Arrests per 100,000 population	554.13	323.63
Anti-alcohol religious groups	Alcohol prohibitionist religious adherents per 100,000 population	383.65	318.37
Major college campus	0 = No major college campus. Counties with a college campus are coded "one" and multiplied by the natural log of full-time student enrollment at the college or university.	.97	2.76
Young adults	Percent of population 18-29 years of age	19.73	5.55
Seat belt law	1 = Primary enforcement of safety belt law	.42	.49
Open-container law	1 = Conforms to federal guidelines	.54	.49
Police force strength	Full-time police officers per 100,000 population	121.71	74.95
DUI behavior	Traffic fatalities involving at least one legally-intoxicated driver per 100,000 population (18 yrs +)	10.23	12.24
Rurality	Urban-Rural continuum code (9= most rural, 1= most urban)	5.17	2.67
Land area	County land area in square miles	973.16	1336.26
South	1= county in Southern U.S. Census region	.46	.49

Independent Variables

Anti-alcohol religious groups. The measure of normative climates against drinking is based on information obtained from the *Religious Congregations and Membership in the United States, 2000* study collected by the Association of Statisticians of American Religious Bodies (ASARB) and distributed by the Association of Religion Data Archives. Anti-alcohol religious group density reflects the number of alcohol prohibitionist religious adherents per 100,000 population. Only alcohol-prohibitionist religions identified in previous research were included: Latter Day Saints, Seventh Day Adventists, Nazarenes, and Southern Baptist Convention (Nelson et al. 2004; Room and Makela 2000).

College campus areas. The measure of pro-drinking normative climates is based on the presence of a major college campus in a county. This information was obtained from the 2000 Integrated Post-Secondary Education Data System "Institutional Characteristics File" available from the National Center for Education Statistics (NCES 2000). Included are colleges and universities that offer at least a bachelor's degree (excluding all law schools, seminaries, vocational schools, and community colleges) and provide aid for student athletes in a football program. The decision to restrict non-football colleges and universities was guided by the increased likelihood of pro-drinking norms (e.g., a party subculture) among students and attendees from the area at "football schools." Note that doing so eliminated many branch campuses and commuter campuses. While there is no generally accepted and widely available measure of widespread drinking norms in college campus areas, this measure seemed intuitive. Thus, the initial measure of "college campus" includes 343 schools. However, there are 17 eligible campuses in the four states (Alaska, Florida, Hawaii, and Illinois) excluded from the study (described below) and are not included in the analysis. Consequently, there are a total of 326 counties with a major college campus (11.1% of all counties under examination). Counties without a major college or university campus are coded "zero" and counties with a major college campus are coded "one." Since it seems important to account for differences in school size, this dummy variable was multiplied by the natural log of full-time student enrollment at the largest college or university (Table 1). As a result, the college campus variable is weighted to simultaneously capture the presence of a campus and differences in the size of the campus. Under the current approach, a large campus area with 25,000 full-time students (e.g., University of Colorado at Boulder) would have a greater value than a campus with 4,000 full-time students (e.g., Western Oregon University).

Age. The measure of *young adults* represents the percent of 18-29 year olds residing in the county and was obtained from the U.S. Census Bureau (2000).

Formal factors. *Seat-belt laws* are coded "one" if state law allows primary enforcement of seat belt laws. In 2000, 1,232 counties in 16 states permitted law enforcement officers to initiate a traffic stop and cite a driver solely for not wearing a seat belt (Table 1). Information on *open-container laws* was gathered from the National Institute on Alcohol Abuse and Alcoholism's Alcohol Policy Information System (NIAAA 2007a). Open container laws are coded "one" if the state of the county conforms to federal open-container law standards (1,580 counties in 28 states) in 2000. The measure of *police force strength* comes from Expenditure and Employment Data for the Criminal Justice System (CJEE) maintained by the Bureau of Justice Statistics (BJS 2000). The CJEE data are based on official government reports and records, central data collection agencies, and mail surveys. Police force strength is measured as the number of full-time police officers with arrest powers working for city, county and state law enforcement agencies per 100,000 population (see Table 1).

Controls. The measure of *DUI behavior* comes from the *Fatality Analysis Reporting System* (FARS) distributed by the National Highway Traffic Safety Administration (NHTSA 1999-2001). The NHTSA has tracked all fatal traffic accidents, including those that involve alcohol since 1975. Many consider traffic fatality data to provide the most accurate information regarding relative levels and distributions of drunk driving because BAC data are derived from pharmacological blood tests on nearly all fatally injured drivers and many surviving drivers in fatal accidents (Schwartz and Rookey 2008). Based on blood-alcohol concentration (BAC) variables provided in the FARS data and state BAC limit law at the time of the accident (NIAAA 2007a), each driver was coded as legally intoxicated if the drivers BAC level exceeded the legal limit. The measure of drunk driving fatalities represents all legally intoxicated drivers involved in fatal traffic crashes per 100,000 population 18 years and older in each county (averaged over 1999-2001).

To account for the impact of *rurality,* "Beale codes" for each county were obtained from the Economic Research Service (ERS) of the U.S. Department of Agriculture and are included as control variables in the analysis. These nine "rural-urban continuum codes" are ordinal and form a classification system that distinguishes metropolitan counties by size and nonmetropolitan counties by level of urbanization and geographical proximity to metro areas (Butler and Beale 1994; ERS 2004). The *land area* of each county is included in U.S. Census geography files and was converted from square meters to square miles. Because this research takes a population-based approach, it is important to control for the geographic scope in which populations reside.

Excluded units. DUI arrest statistics (1999-2001) were unavailable from the FBI for all counties in two states (Florida n= 67 and Illinois n=102) and were

excluded from the analysis. Alaska (county equivalents including 15 boroughs, 11 census geography areas and municipalities) Hawaii (4 counties and 1 non-governmental unit) were excluded to limit the analysis to the continental U.S. Other areas, including District of Columbia, Shannon County South Dakota, Essex County Vermont, and five boroughs in New York City, were also excluded due to lack of data availability. Thus, the total number of counties under examination is 2,916.

Spatial Interrelationships

Spatial dependence takes place when the values of one unit are influenced or dependent on values of geographically proximate units. Tobler's enduring observation summarizes this point—"everything is related to everything else, but near things are more related than distant things" (Tobler 1970:236). In this study, there are theoretical and methodological motivations for examining and adjusting for spatial dependence. The role of spatial structures, such as highway transportation networks, residential patterns and growth, in combination with the spatial nature of drunk driving, may increase spatial dependence in rates of DUI enforcement between neighboring counties. It is possible that DUI enforcement depends on unobserved factors in proximate counties and spatial dependence arises from the unobservable latent variables that are spatially correlated (LeSage 1998). The presence of positive spatial autocorrelation results in a loss of information, which is related to greater uncertainty, less precision, and larger standard errors (Anselin 2005). Thus, additional steps must be taken in this research to examine and adjust for spatial autocorrelation.

Exploratory Spatial Data Analysis (ESDA) is used to analyze and present the distribution of key variables and to diagnose spatial dependence and autocorrelation (Messner et al. 1999). ESDA includes measures of global spatial autocorrelation (Moran's I) and Local Indicators of Spatial Association (LISA). In brief, Moran's I is a measure of *global* spatial autocorrelation and ranges in value from 0 to 1, where higher values indicate greater spatial clustering. The measure captures the extent of overall clustering that exists among all counties in the U.S. In contrast to Moran's I, LISA measures the extent of significant spatial clustering of similar values around each place (Oakley and Logan 2007). The LISA procedure identifies four types of localized clusters of significant spatial correlations—high values surrounded by other high values (High-High), low values surrounded by other low values (Low-Low), low values surrounded by high values (Low-High), and high values surrounded by low values (High-Low).
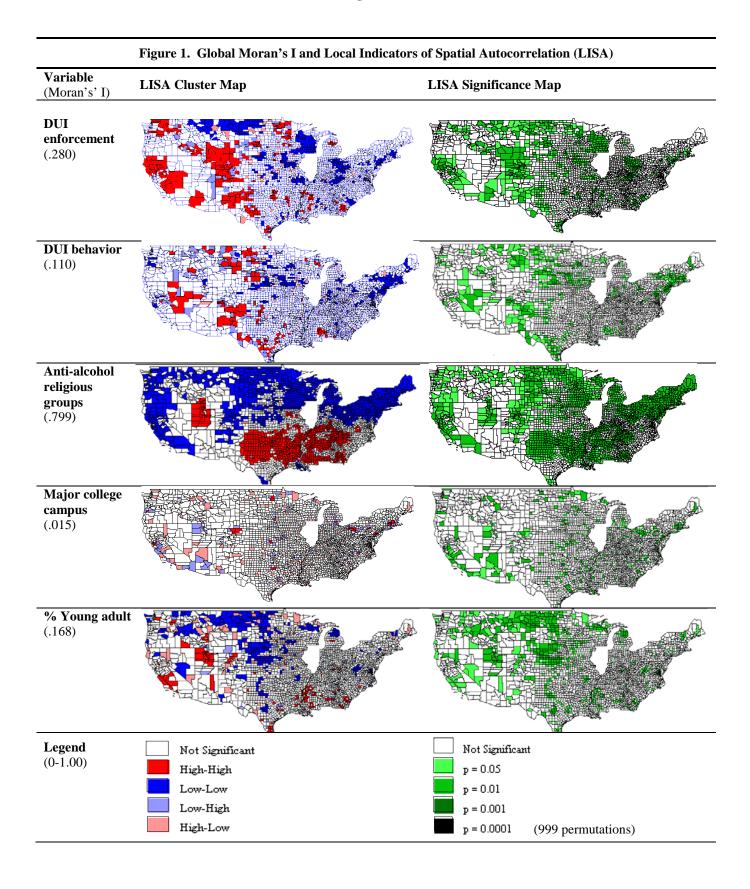
ANALYTIC STRATEGY

Analysis of these data proceeds in three main steps. *First*, Exploratory Spatial Data Analysis (ESDA) is presented to show the spatial characteristics of key factors across U.S. counties. ESDA is an advantageous first step in examining and diagnosing spatial dependence and spatial autocorrelation among units of analysis. *Second*, bivariate analyses will assess inter-item correlations among measures. Bivariate correlation coefficients preview expected relationships and is a required step in diagnosing collinearity among independent variables. *Third*, after a series of spatial regression diagnostic tests to determine which spatial regression technique is best suited (see Anselin 2005; Baller et al. 2001), several spatial error regression models are presented to compare the effects of informal and formal factors on DUI enforcement.

RESULTS

Univariate Analysis: Exploratory Spatial Data Analysis (ESDA)

Univariate spatial data analysis results show the uneven distribution of *enforcement of DUI laws (arrest)* (see Figure 1). The global Moran's I of .28 suggests low to moderate spatial clustering of counties experiencing similar levels DUI enforcement. Significant high-high clusters (high rates surrounded by high rates) of counties are observed in the regions of the west and low-low clusters (low rates surrounded by low rates) are observed in the north plains and areas of the Great Lakes region. While these results show that global spatial autocorrelation of DUI rates among counties is not particularly high, the extent of local spatial autocorrelation (LISA) suggests that adjustments for spatial autocorrelation are necessary in regression analysis. That is, the visual representation of the distribution and indicators of global and local spatial association of DUI enforcement confirms the diagnostic test results that spatial autocorrelation is present among counties in the United States.

As shown in Figure 1, the LISA and global measures of spatial autocorrelation (Moran's I = .799) show that there is considerable clustering of anti-alcohol religious groups across counties in the U.S. The LISA cluster map shows high spatial clustering of counties with high rates of anti-alcohol religious adherents surrounded by other high-rate counties, particularly in the South and areas of Utah and southern Idaho. This suggests that areas where normative climates against drinking are strong tend to be located near similar communities.

Figure 1. Global Moran's I and Local Indicators of Spatial Autocorrelation (LISA)

Variable (Moran's' I)	LISA Cluster Map	LISA Significance Map
DUI enforcement (.280)		
DUI behavior (.110)		
Anti-alcohol religious groups (.799)		
Major college campus (.015)		
% Young adult (.168)		
Legend (0-1.00)	Not Significant High-High Low-Low Low-High High-Low	Not Significant p = 0.05 p = 0.01 p = 0.001 p = 0.0001 (999 permutations)

Bivariate Analysis: Correlations

Results of univariate ESDA visually suggest that levels of drinking places and anti-alcohol religious groups are spatially clustered in the South, which is consistent with previous research by Stark (1996). These results support an analysis of bivariate correlations, presented in Table 2. There is a moderate positive correlation (r =.637, p <.05) between anti-alcohol religious groups and the South. Based on this information, it seems important to include a statistical control for "South" in regression analyses. There is a weak positive correlation between the density of anti-alcohol religious groups and both DUI enforcement (r = . 074, p <.05), and in general, it appears that the correlations between the each informal measure and DUI enforcement are weaker than for the measures of formal factors.

Table 2. Bivariate Correlation Matrix

		1	2	3	4	5	6	7	8	9	10
1	DUI enforcement	…									
2	Anti-alc religious	.074*	…								
3	Major college campus	.011	-.086*	…							
4	Young adults	.123*	.065*	.511*	…						
5	Seat belt laws	.118*	.145*	-.022	.077*	…					
6	Open container laws	-.110*	-.311*	.042*	-.095*	-.095*	…				
7	Police force strength	.194*	.027	-.091*	-.118*	-.019	-.088*	…			
8	DUI behavior	.089*	.071*	-.120*	-.100*	.004	-.109*	.222*	…		
9	Rurality	-.002	.112*	-.255*	-.346*	-.143*	.037*	.137*	.231*	…	
10	Land area	.132*	-.119*	.024	-.015	-.039*	.071*	.089*	.145*	.078*	…
11	South	.059*	.637*	-.017	.178*	.246*	-.440*	.026	.070*	-.086*	-.253*

* Correlation coefficient is significant at the p < .05 level (two-tailed test).

Multivariate Analysis: Spatial Regression Models

Based on results from tests of spatial dependence, factor analysis (Principle Components) and Ordinary Least Squares (OLS) regressions (not shown), results from *spatial error models* are presented (see Baller et al. 2001). The formal expression of the spatial error regression model here is $y = X\beta + \varepsilon$, with $\varepsilon = \lambda W \varepsilon + u$, where y is a vector of observations on the dependent variable, *W* is the spatial weights matrix (i.e., row-standardized queens contiguity) on the explanatory variables, ε is a vector of spatially autocorrelated error terms, *u* a vector of independent and identically distributed (IID) errors, and λ and β are parameters (Anselin 2005).

Consistent with expectations, greater presence of anti-alcohol religious groups is associated with increased DUI enforcement (m1, β=.048, p<.05), but the effect falls from statistical significance when controlling for the South as shown in (Table 3, model 2). When other informal factors and formal factors (i.e., seat belt law, open-container law, and police force strength) are included, the effect of anti-alcohol religious groups (m6: β = .055, p<.05) is positive and statistically significant on DUI enforcement while controlling for South. The effect of college campus (m3: β = .036, p<.05) is positive and statistically significant on DUI enforcement when the measure of young adults is absent from the model. However, the effect (β = -.032, p<.05) is negative and statistically significant when young adults enters the model. The effect of young adults is positive and statistically significant when considered alone (m4: β = .127, p<.001), with major college campus (m5: β = .145, p<.001) and with anti-alcohol religious groups (m6: β = .147, p<.001).

In all models, primary enforcement of seat belt laws (β = .101, p<.001) and police force strength (β = .205, p<.001) are associated with higher levels of DUI enforcement and open-container laws are associated with decreased DUI enforcement (β = -.075, p<.01). A greater proportion of the total explained variance in DUI enforcement is attributed to formal factors compared to informal factors.   The coefficient for the spatial autoregressive term (λ) is positive and statistically significant.   Inclusion of the spatial autoregressive coefficient in these models reduces bias in standard errors and improves the accuracy of results.

Table 3. The Effects of Selected Informal and Formal Factors on DUI Enforcement (Arrest Rates), Spatial Error Regression. n=2916.

	1 b	1 β	2 b	2 β	3 b	3 β	4 b	4 β	5 b	5 β	6 b	6 β	Proportion of total variance
INFORMAL:													
Anti-alc religious	.048* (.026)	.047	.043 (.030)	.042	…		…		…		.055* (.029)	.054	.0014
Major college campus	…		…		4.273* (1.938)	.036	…		-3.739* (2.243)	-.032	-3.513* (.245)	-.030	.0013
FORMAL:													
Seat belt law p.e.	67.351*** (17.935)	.103	66.193** (18.259)	.101	67.730*** (18.336)	.103	67.240*** (18.087)	.103	65.909*** (18.072)	.101	66.215*** (18.038)	.101	.0110
Open-container law	-53.028** (18.095)	-.082	-50.992** (19.064)	-.078	-52.598** (19.123)	-.081	-50.396** (18.881)	-.078	-49.303** (18.860)	-.076	-48.612** (18.829)	-.075	.0041
Police force strength	.835*** (.083)	.193	.835*** (.082)	.193	.839*** (.082)	.194	.878*** (.081)	.203	.879*** (.081)	.204	.884*** (.081)	.205	.0321
CONTROLS:													
Young adults	…		…		…		7.421*** (1.045)	.127	8.464*** (1.217)	.145	8.539*** (1.217)	.147	.0177
DUI behavior (fatalities)	.667 (.462)	.025	.659 (.463)	.025	.714 (.463)	.027	.825* (.460)	.031	.790* (.460)	.030	.812* (.460)	.031	.0007
Rurality	-7.479** (2.643)	-.062	-7.386** (2.659)	-.061	-5.720* (2.674)	-.047	-1.763 (2.697)	-.015	-2.011 (2.699)	-.017	-2.669 (2.720)	-.022	.0001
Land area	.018*** (.005)	.074	.018*** (.005)	.074	.017** (.005)	.070	.016** (.005)	.066	.016** (.005)	.066	.016** (.005)	.066	.0128
South	…		8.351 (24.313)	.013	24.923 (21.340)	.038	10.948 (21.148)	.017	9.401 (21.124)	.014	-12.765 (24.165)	-.020	.0006
λ	.462*** (.023)		.463*** (.023)		.466*** (.023)		.462*** (.023)		.461*** (.023)		.459*** (.023)		
Constant	449.135*** (25.408)		445.921*** (27.146)		441.862*** (27.272)		280.059*** (35.949)		265.108*** (37.002)		254.514*** (37.383)		
R^2	.220		.220		.222		.233		.234		.234		
ll	-20693		-20693		-20692		-20669		-20668		-20666		

Note: *p≤.05; ** p≤.01; ***p≤.001 (one-tailed test). Standard errors in parentheses.

DISCUSSION AND CONCLUSION

This research set out to explain macro-level differences in DUI enforcement across areas by examining how a set of informal factors, such as normative climates toward drinking, and a limited set of formal legal factors are related to levels of DUI enforcement across counties. It was unclear whether "informal factors" (i.e., non-legal factors) exert effects on DUI enforcement independent of formal legal factors, such as seat belt laws, open container laws and police force strength. Results suggest that informal factors do appear to account for some of the variation in the enforcement of drunk driving independent of the formal factors measured in this research. In particular, DUI enforcement, which is in part an indicator of offending behavior and also a measure of law enforcement behavior, seems to vary in relation to normative climates toward drinking, controlling for police force strength and DUI behavior.

Consistent with expectations, there tends to be higher rates of DUI enforcement by police where the normative climate towards drinking contains strong *anti-drinking* norms. That is, law enforcement agencies appear to make higher levels of DUI arrests per population in areas with a strong normative climate against drinking. Conversely, areas with a normative climate that defines drinking as acceptable behavior are associated with lower rates of DUI enforcement. Together these findings suggest that police behavior in enforcing DUI laws is related to area-wide normative climates toward drinking.

Overall, these findings suggest that to understand variation in the enforcement of DUI it is useful to account for normative climates of an area. While it is common for statistical models predicting arrest rates to include controls for cultural differences by including a variable for the South or age structure of the population, it seems important to consider widely held cultural norms that influence police enforcement and behavior. Research on the relationship between religious cultural norms and crime rates suggests that strong normative climates, where religion-based moral standards enter into the normative system, are characteristic of the Southern United States. In this study, the effect of anti-alcohol climates has a positive and statistically significant effect on rates of DUI enforcement while controlling for the South. This suggests that the relationship between normative climates against drinking and DUI enforcement is not limited to areas in the South.

Results also suggest that some of the variation in DUI enforcement by police across areas is also related to *pro-drinking* normative climates. That is, areas where the normative climate defines drinking as acceptable behavior tend to be associated with lower rates of DUI enforcement. In this research, pro-drinking normative climates are measured as the "weighted" presence of a major college campus in the area, where a dummy variable indicating the presence of a main campus is multiplied by logged student enrollment at the school. Controlling for the proportion of young adults, DUI enforcement tends to be lower in areas where there is a greater college campus presence. While the normative climate is generally accepting of drinking among young adults, the greater presence of a college campus appears to be a protective factor in the enforcement of DUI laws. This finding may provide some support for the assertion that many college campuses have an impact on the community and the behavior of law enforcement agencies in the area (including city, state, and campus police agencies).

One explanation of this relationship is that DUI enforcement by police differs in relation to the pro-drinking normative climate through less intensive enforcement of alcohol-related problems. In areas where drinking behavior does not conflict with the normative climate, police from various law enforcement agencies may be more tolerant of drinking-related behavior. Unlike areas with strong widely-held norms against drinking, police may not experience a similar level or type of community pressure to address drunk driving through proactive policing. However, counties with major college campuses could be more amiable to alternative forms of transportation. The dense residential patterning (e.g., more dormitories, apartments, and multi-unit dwellings) and more extensive local services, including drinking places where customers can purchase and consume alcohol in campus counties, may result in lower levels of DUI behavior (Mosher and Akins 2007; Ross 1992). While the use of counties as units of analysis in this study does not allow these factors to be measured, future research at the city-level would help us understand how campus-area transportation structures, residential patterning, and the spatial patterning of businesses (including drinking places) relate to rates of drunk driving enforcement and norms concerning drinking.

The formal legal system features many laws, ordinances, and police practices aimed at reducing and deterring drunk driving. Even though the formal laws considered in this research are enacted at the state level, there is within-state variation in the enforcement of laws that may help account for differences in DUI enforcement across counties. A goal of this research was to examine the extent to which informal factors exert effects on rates of DUI enforcement independent of formal factors. Results suggest the informal factors related to the normative climate regarding drinking are related to DUI enforcement independent of formal legal factors. While the set of informal factors (i.e., non-legal factors) account for some variation, formal factors explain a greater proportion of the variance in DUI enforcement than is explained by informal factors. These findings are not unexpected because as Jacobs (1989) suggests, the social control of drunk driving behavior remains heavily

dependent on "governmental initiatives" and less on non-legal informal factors.

It is important to note that this research has only considered a limited set of state-wide laws aimed at reducing or deterring drunk driving behavior. While several additional laws (e.g, dram shop liability, social host liability, mandatory ignition locks and administrative license revocation for convicted drunk drivers) have been adopted by some states, the laws included in this research are sufficient in representing differences in legal factors that increase police ability to detect and arrest drinking drivers among county populations. Moreover, it is important to recognize that using state-level measures of formal laws has negative implications when included in linear regression models. A state-level measure in a county-level analysis violates the assumption of independent errors because counties are spatially clustered in states—leading to biased standard errors (Fullerton, Wallace, and Stern 2009). Multilevel modeling techniques could adjust for these problems by allowing for separate error terms at the county-level and state-level. However, the spatial regression techniques used here adjust for spatial dependencies among counties (also violating the assumption of independence) by including a spatially lagged error term in the regression models. Therefore, accounting for spatial dependencies between counties seemed of foremost importance as rates of DUI enforcement are influenced by factors in surrounding counties.

While the use of counties as units of analysis has several distinct advantages in this research, there are several implications for the interpretation and utility of results. A potential limitation of this research concerns the assumption that normative climates toward drinking are measurable—particularly at the county-level. While previous research has measured county-level variation in moral climates by the density of religious adherents per population (Lee 2006), it is quite possible "climates" are not accurately measured by the greater presence of groups holding certain cultural values and beliefs. The rationale behind the measurement of normative climate towards drinking relies on assumptions that these groups actually hold strong norms concerning drinking and the greater representation of the relevant group represents variation in the strength of the normative climate in the area. While much literature suggests that people take into account cultural and normative standards in deciding their own actions, the findings of this research can be called into question if these assumptions are incorrect.

In addition, informal social and political climates, organizational characteristics of police departments, as well as local alcohol ordinances, occur at the city-level (and multi-city agglomerations). When counties are used as units of analysis, local factors that are also likely to influence patterns of DUI enforcement are not directly measured. Similarly, studies employing administrative

and statistical areas (e.g., zip code tabulation areas, census tracts, and census blocks) consistently confront the modifiable areal unit problem where results may differ depending on how populations are parceled in space (Irwin 2007). In this study, it is important to recognize that the effects of factors that are specific to smaller areas, such as cities or neighborhoods, may be less intense when observed at the county-level. Future research should be conducted to understand how additional formal factors, such as local alcohol ordinances, police resources, and informal factors, such as social and political climates, influence DUI enforcement by local police departments at the sub-county level. Since counties are important spaces where many governmental processes are carried out (i.e., jails, courts, public health) (Lobao, Hooks, and Tickamyer 2007), future research should also employ multilevel statistical techniques to simultaneously analyze data collected at multiple levels (i.e., cities and counties) to better understand how macro-level contexts influence individual offending behavior and police behavior in enforcing laws.

Criminologists should continue to explain how normative climates influence the enforcement of laws and affect the patterning of alcohol-related crime. Efforts to understand how offense-specific normative climates (e.g., normative climates against DUI) affect rates of behavior could yield important information for developing more effective control policies. In the case of drunk driving, criminologists and policy makers should work to increase the strength of anti-drunk driving norms so that DUI control efforts, as Jacobs (1989) suggests, "would not be so dependent on governmental initiatives and could rely on less intrusive, informal interpersonal controls and on personal choices and inhibitions" (195).

Jacobs (1989) argues that the long-term goal of controlling DUI should involve a wide-scale internalization of anti-DUI norms, which would rely on informal social controls and not depend so much on formal policies. The results of this cross-sectional research (based on 1999-2000 data) suggest that while formal laws and official policies explain some of the differences in DUI, normative climates toward drinking also help account for differences in DUI enforcement across areas. Future research should investigate whether the strength of normative climates concerning drinking, and perhaps more importantly drunk driving, has increased over time and recommend long-term strategies to increase conformity to anti-DUI norms across the general population. Efforts to increase the widespread internalization of anti-DUI norms would require a large amount of resources, but in the long-term, vast savings could be realized as effective control of DUI would necessitate less allocation of official resources than are used today.

Endnotes

[1] Multicollinearity is a persistent problem in macro-level research because many basic population characteristics are strongly intercorrelated. Multicollinearity can inflate standard errors for regression coefficients leading to unstable parameter estimates. Additional regression diagnostics tests were conducted (not presented) to inspect for multicollinearity. An analysis of variance inflation factor values (VIF) indicated that no VIF value for variables in any model exceeded 2.19 (South), suggesting that multicollinearity is not a serious concern among independent variables. Because the measure of college campus area is related to age structure ($r = .511$), it was suspected that collinearity would be problematic in models containing both measures. However, VIF value for age structure is 1.52 and 1.40 for college campus, among the full set of independent variables.

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Demographics and Homicide in Canada: A Fixed-Effects Analysis of the Role of Young Males on Changing Homicide Rates

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Abstract: *Canadian homicide rates have declined steadily since the mid-1970s, though this overall trend has been punctuated by temporal and regional fluctuations. It is almost consistently noted that young males are overrepresented in the interpersonal violence equation, and changes in this demographic can greatly affect homicide rates. Yet the ubiquity of the positive effect of age-composition has been questioned. Using fixed-effects analysis, this paper examines the relationship between young males and homicide rate changes over a thirty-year period. Results indicate that homicide rate changes in Canada are indeed a function of changing demographics; however, the relationship is complex, and socio-economic factors both mitigate and exacerbate this relationship.*

Keywords: demographics, Canada, fixed-effects, homicide

INTRODUCTION

Over the long term, western societies have experienced a decrease in levels of interpersonal violence (Elias [1939] 1978; Gurr 1981),[1] but more recent homicide patterns demonstrate geographical and temporal fluctuations (Archer and Gartner 1984; Blumstein and Rosenfeld 1998). The causes and correlates of homicide are complex and remain an important focus of debate for criminologists: some argue that sociological, economic, and cultural factors all affect homicide patterns (Phillips 2006). One of the most consistent explanations for the uneven distributions of violence over time and place is demographic variation (Andresen et al. 2003; Blumstein 2006; Cohen and Land 1987; Fox 2006; Fox and Piquero 2003; Gottfredson and Hirschi 1990). Slight changes in the population age structure over time are evident, and it has been well documented that young males are disproportionately responsible for criminal activity (Gottfredson and Hirschi 1990).

Gottfredson and Hirschi (1990) maintain that the age-crime relationship holds across time and location, and research at the individual level demonstrates a strong association between age and crime (Blumstein et al. 1986;

Cohen and Land 1987; Fox and Piquero 2003; Hirschi and Gottfredson 1983). There is also support for a causal relationship between age composition and rates of interpersonal violence at the aggregate level (Fox 2006; Fox and Piquero 2003). However, there is significant disagreement regarding whether demographics actually dictate the homicide rate, or if other factors of equal, or perhaps more, weight might affect change in rates of violence (Blumstein 2006; Fox 2006; Gartner 1990; Gartner and Parker 1990). For example, research findings related to age composition overall are inconsistent, in that they sometimes indicate an interaction between demographics and changing socio-economic factors (Blumstein 2006; Pampel and Gartner 1995; Phillips 2006).

The relationship between age composition and violence is largely supported by national studies, but it has less support cross-nationally (Gartner 1990). In addition, although demographics are widely accepted as a strong predictor of interpersonal violence rates in the United States, it is also recognized that they influence Canadian rates even more (Andresen et al. 2003). Canada is a particularly fertile field within which to examine changing rates of homicide given the regional variation in

demographics, population density, heterogeneity, and economic factors. National examinations of homicide in Canada have not thus far studied the interaction between demographics and socio-economic factors. Examining how the correlates and causes of homicide function can illuminate certain aspects of interpersonal violence and social structure in Canada. In order to examine Canadian homicide rate fluctuations and the factors which influence temporal/geographical trends of violence, this analysis utilizes the varying homicide rates in seven regions from 1976 to 2005. A time series cross sectional (TSCS) dataset was constructed using information from both the Canadian Homicide Survey and Statistics Canada resources, and a fixed-effects analysis was utilized to examine the effects of structural factors on homicide rates.

Temporal and Spatial Variations in Interpersonal Violence

Although Canada displayed an overall decline in homicide rates throughout the period of interest, this downturn is not evenly dispersed over time and place (Gartner 1990; Silverman and Kennedy 1993). In the United States, Blumstein and Rosenfeld (1998) noted that sharp rate changes were related to an urban homicide epidemic starting in the late 1980s, an epidemic largely associated with the urban crack-cocaine market and the gang violence commonly associated with that activity, as well as young males' increased access to guns (Johnson, Golub and Dunlap 2006; Messner et al. 2005; Pearson-Nelson 2008). There was no similar epidemic in Canada,[2] American rates consistently exceed Canadian rates[3] at all points (Hagan 1991). In addition, homicide rates do not emerge as being driven by urban homicides in Canada. Where population density is an essential factor in most homicide research in the United States, Canada does not appear to display this same trend (Statistics Canada 2007).

Regionally, the United States homicide rates vary between states. Historically, the southern regions of the United States boasted the highest homicide rates (Redfield [1881] 2000). This trend was said to be a result of southern historical circumstances that lead to a culture of violence (Gastil 1971; Hackney 1969; Wolfgang and Ferracuti 1967). Others have argued that regional distributions in the United States were due to poverty (Loftin and Hill 1974; Williams 1984) or rates of inequality (Blau and Blau 1982). Homicide rates in Canada are also unevenly distributed, with higher levels of interpersonal violence in the western regions (Brantingham and Brantingham 1984; Kennedy et al. 1991). There is also regional diversity in demographic shifts, economic patterns, migration experiences, and overall socio-political histories. It is widely argued that such dynamics differ between eastern and western Canada (Brantingham and Brantingham 1984), and researchers tend to attribute the west's higher rates to a number of potential contributory factors

generated by higher levels of social disorganization (Kennedy et al. 1991). The western provinces currently experience higher in-migration, higher divorce rates, and higher levels of income inequality than do the Maritimes, Quebec, and Ontario.

Demographic Changes and Homicide Rates

The age/crime relationship is well established at the individual level (Gottfredson and Hirschi 1990; Levitt 1999); criminal activity increases noticeably during the mid-teen years and peaks at around the age of 20, following which, this criminal propensity steadily declines (Blumstein and Wallman 2006; Gottfredson and Hirschi 1990; Fox and Piquero 2003; Phillips 2006). This fundamental criminological phenomenon is designated as the "age-crime curve" (Blumstein 1995; Gottfredson and Hirschi 1990). In addition to the age-crime relationship, it is also well documented that gender is an important factor; males are significantly more likely to be involved in criminal and violent behavior than are females. Gender is the most significant influential demographic factor; however, it is indicated as the least relevant due to its almost static proportional makeup across time (Blumstein 1995; Blumstein 2006). This may not always be accurate. For instance, when mapping the gender structure of the population in Canada, one does see a few regions in the west where this steady expected proportion is changed by a large influx of young unmarried males.

It is the combination of both age and gender which account for large differences in criminal involvement (Gottfredson and Hirschi 1990; Blumstein 1995). Gottfredson and Hirschi (1990) maintain that there is an inherent pathological characteristic within the young male demographic. This segment of the population tends to participate in high risk, and potentially violent, behaviour, because little importance is placed on the future (Wilson and Daly 1997), and they are less susceptible to mechanisms of social control (Gartner 1990).

It follows then, that the population age structure of a given area can affect rates of interpersonal violence.[4] Thus, an overall increase in this crime-prone group is likely to amplify levels of interpersonal violence; conversely an aging population should result in decreased violence rates. Steffensmeier, Streifel and Harer (1987) found that the crude homicide rate dropped in the early 1980s, when the baby boomer cohort began to move out of the high risk age group and into their twenties and thirties. In Canada, Andresen et al. (2003) insisted homicide rates be measured as a function of the young male demographic, rather than the entire population, thus stressing the importance of these demographic factors. Although the combination of gender and age demonstrably influences the homicide rate, there is some debate regarding the importance of these demographic factors. All else being equal, the population's age dictates the homicide rates (Fox 2006), but given how

rarely all else is in fact equal, many other factors can intercede to affect levels of interpersonal violence (Blumstein and Wallman 2006; Gartner 1990; Grogger 2006; Johnson et al. 2006; Phillips 2006). Gartner (1990) and Gartner and Parker's (1990) cross-national analyses suggest that fluctuations in the proportion of young males in the population do not consistently predict homicide rates, positing that other issues may be more important. Cross-national comparisons usually yield different results than intra-national analyses; however, these empirical examinations suggest that the assumed association between age structure and homicide is much more complex. Phillips' (2006) examination of multiple counties in the United States also indicates that the population/age proportion is relevant, but that social conditions can alter this association. Pampel and Gartner's (1995) analysis found that the development of national institutions could mediate the effect age structure has on homicide rates. Clearly, the interaction of gender and age with other factors is complex and requires further analysis; there is likely interplay between demographics and socio-economic influences.

Socio-Economic Factors

Socio-economic factors have long been argued to affect rates of violence. Fluctuations in employment rates and unequal distribution of resources, among other economic changes, have both emerged as significant influences upon rates of interpersonal violence. However, economic indicators such as GDP and employment rates are often found to be in direct opposition to proponents of distributive influences. Inequality factors are strongly linked to anomic factors. Kennedy, Silverman and Forde (1991) note that regional variations in Canadian homicide rates are artefacts of inequality dynamics, and of the socially structured allocation of social disorganization. Disorganized social factors, such as migration patterns, transiency, and the broken homes stemming from divorce, have all been shown to affect rates of violence.

Economic factors ground much criminological theory, and numerous studies demonstrate that disparities in the distribution of economic advantages impact homicide rates (Kubrin 2003; Weiner, Zhan and Sagi 1990; Williams and Flewelling 1988). Economic downturns or decreased employment levels in particular regions are linked to increased levels of interpersonal violence (Grogger 2006). When employment opportunities are restricted, individuals sometimes turn to crime. Conversely they may turn away from crime when legitimate employment options are available to them (Grogger 2006; Steffensmeier et al. 1987). Indeed, Blumstein and Rosenfeld (1998) point out that the decline in homicide in the 1990s in the United States is at least partially the result of a country-wide economic expansion. Grogger (2006) asserts that criminal involvement is the result of the interaction between

legitimate and illegitimate opportunities. Others maintain there is no relationship between unemployment and interpersonal violence (Fox 1978, Gottfredson and Hirschi 1990). Kapuscinski, Braithwaite and Chapman (1998) indicate that although there is a large body of literature examining the relationship between criminal behavior and unemployment rates, there remains large disagreement as to its impact. Empirical evidence is inconsistent, and the relationship does not appear to hold up in longitudinal analyses (Hu, Webster and Baker 2008; Kapuscinski et al. 1998).

Homicides are concentrated in the bottom strata in all western societies; therefore, Blau and Blau (1982) and Gartner (1990) argue that rates of unemployment do not reveal actual economic deprivation, as they do not capture levels of inequality. Relative deprivation, for instance, can increase frustration and lead to higher levels of interpersonal violence (Jacobs and Richardson 2008) than basic employment levels might predict. Wilkinson's (1996) examination of inequality notes that wealthy societies often lack social cohesion when their wealth is paired with unequal resource allocation. Inequality levels escalate in the absence of social and distributive justice, as do mortality rates (Wilkinson 1996 and 2006). Divergent distribution weakens the social fabric, thereby damaging the citizenry's well-being and increasing crime rates (Wilkinson 2006). Daly et al. (2001) found that inequality was a strong predictor of homicide in Canada.

Intra-nationally, distributions of both unemployment and inequality are uneven across the country, and over the years of the present study, Canada's levels of inequality have increased overall, with the western provinces experiencing higher levels of inequality than do the eastern provinces. Alternatively, current employment rates in Canada are much higher in the western provinces, with the highest exhibited by oil rich Alberta. Absolute deprivation, a factor also demonstrated to impact rates of violence, is also unequally distributed across the country (Blau and Blau 1982); however, data are limited in Canada related to poverty distribution.

Social disorganization implies a deficiency of community cohesion resulting in an anomic situation that is strongly tied to distributive factors. Social disorganization is elevated in highly mobile areas with transient populations which lack shared norms and values (Kubrin 2003; Shaw and McKay 1942). According to Shaw and McKay (1942), two of the most important contributory features are heterogeneity and mobility. Migration influxes into particular regions are often used as proxies for both heterogeneity and regional mobility. Williams and Flewelling (1988) cite increases in rates of family dissolution as a sign of weakened inter-individual ties, a factor commonly associated with social disintegration. In Canada, various features of anomie are not evenly distributed either geographically or temporally. Divorce rates, in-migration, and heterogeneity are all

currently more common in the western provinces. Owing to its economic strength, which has produced a need for workers, Alberta has recently been the region with the leading interprovincial migratory gains in Canada (Statistics Canada 2008). However, migration patterns have changed over the time of study (Sharpe, Arsenault and Ershov 2007).

Interacting Factors: Demographics and Socio-Economic Factors

A large amount of research has been dedicated to examining the impact that changes in demographics have on changes in homicide rates. The proportion of young males affects rates of interpersonal violence, and the population's overall age structure is thought to be a key factor in determining homicide rates (Fox and Piquero 2003). However, as some have noted, the relationship between cohort size and rates of violence is more complex than that evident association implies, and it is likely mediated by socio-economic factors (Gartner 1990; Pampel and Gartner 1995; Phillips 2006). The nature of the relationship between demographics and levels of interpersonal violence is unlikely to work in isolation.

Easterlin's (1978) theory proposed that cohort size would influence age-specific rates. In particular, Easterlin (1978) indicated that very large cohorts face many barriers in opportunities in their teens and twenties. Larger cohorts would experience obstacles to employment; therefore increasing their risk of criminal behavior. For O'Brien, Stockard and Isaacson, (1999) this was not simply due to the reduction in the labour market opportunities but also a decline in the ability for mechanisms of social control to restrict behaviour. Agents of social control would be overburdened by large cohorts of youth and therefore these groups are less likely to be properly integrated into society. Pampel and Gartner (1995) indicate that in locations where perhaps there are better opportunities for young people, the effect of a large cohort may be mitigated.

The age composition in a given region at a given time likely interacts with the region's levels of unemployment, levels of inequality, and social disorganization factors, thus mediating or exacerbating rates of interpersonal violence. For example, Phillips (2006) found that young males interacted with levels of social disorganization in their affect on inter-personal violence rates. In times and locations where large cohorts face better options and less stress, the effect of the proportion of young males on homicide rates may be restrained (Pampel and Gartner 1995). These same factors in Canada could exacerbate the relationship between young males and homicide. Areas in Canada with high migration rates of young males, or high migration with a pre-existing high proportion of young males, could experience aggravated levels of social disorganization thereby increasing rates of violence.

In sum, the goal of my research is to examine the effects of the changing young male demographic on homicide rate fluctuations and the way in which demographics interact with socio-economic changes. I use the Canadian Homicide Microdata and CANSIM (2008) data to examine this by testing the following hypotheses derived from the theories and literature discussed above:

1) Increases in the proportion of young males will positively affect homicide rates

2) Changes in the proportion of young males will interact with at least one, but not both, of the economic indicators (unemployment rate and inequality) in their effect on homicide rate changes.

3) Changes in the proportion of young males will interact with at least one of the social disorganization factors (migration rate and divorce rate) in their effect on homicide rate changes.

Methodology and Data Sources

This research examines factors affecting temporal and geographical homicide rate changes in seven regions of Canada from 1976 to 2005. Six of the regions are in fact provinces: Quebec, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. The final region utilized for this analysis is the amalgamated region of the Maritimes. The Maritimes, or the four Atlantic Provinces (New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland/ Labrador), were placed together as one geographic unit due to their relatively small geographic and population sizes. I use several data sources in order to compile a cross-sectional time-series dataset which includes repeated measures of homicide rates, demographic features and socio-economic indicators.

Although considerable contemporary criminological research is focused on smaller geographic units, such as cities and neighborhoods, the region is a useful unit of analysis for an examination of homicide trends in Canada because of the significance of provincial level characteristics, as well as better data availability at the regional level. Homicide in the United States is primarily examined at the city level as it is considered an urban phenomenon; Canadian statistics, however do not show this same pattern (Statistics Canada 2007),[5] largely due to the small number of homicides occurring each year in the nation as a whole. Data at the regional level in Canada can provide broad explanations for changes at the provincial/regional level and can capture the differences between the regions with respect to the dependent, control and test variables.

Data Sources

The Canadian Homicide Microdata (2008) are derived from the Canadian Homicide Survey. Each police department is responsible for collecting detailed information on all homicides within their jurisdiction.

These data are compiled annually by the Canadian Centre for Justice Statistics (CCJS). The crude homicide rate (CHR) was calculated for each province/region for every year of the analysis in the usual way: by taking the number of total homicides from a region, from the Homicide Microdata, dividing them by the total population of the region, taken from Statistics Canada, and then multiplying by 100,000 to create a rate. The nation was divided into seven regions without the northern territories. The northern territories were removed due to the relatively small population size and lack of information on the independent variables as indicated above. Urban areas could not be utilized as a unit of analysis due to data limitations: although homicide rates could be calculated, the remaining structural variables were unavailable in their entirety at the census metropolitan area (CMA) level.

The independent variables for the fixed-effects models were derived from CANSIM[6] (Canadian Socio-economic Information Management System): Statistics Canada's computerized socioeconomic database (2009). The CANSIM data are updated daily and contain socio-economic, demographic, health, education and justice statistics on the regions of Canada. These data are limited access, but licensed to a variety of Academic Institutions in Canada. Data for each independent variable were collected on an annual basis from 1976 to 2005 for each region or province. The main variable of interest, young male population, was measured as the proportion of young males of ages 15 to 29 in each region for each year[7].

The two economic variables were collected: unemployment rate and income inequality rate. The regional unemployment rate is calculated by Statistics Canada as the percentage unemployed of the total employable population. The inequality rate is defined as the provincial level gini coefficients. The gini coefficient is the commonly used statistic for determining level of inequality. The gini is an index which measures the level of inequality in the distribution of incomes in an area. It is calculated from the *lorenz curve* in which cumulative income is plotted against the number of arranged incomes from the poorest to the richest (Firebaugh 1999).

Two social disorganization variables were computed for this analysis: the divorce rate and the migration rate. The crude divorce rate was calculated by the number of divorces in a region divided by the population of that region multiplied by 1000. The crude migration rate was calculated using the number of migrants moving into a region divided by the total population of that area multiplied by 1000. Lastly, a population density control variable was calculated: the population of each area for each year was divided by the squared kilometres of each area.

Fixed-effects Cross-Sectional Time-Series Models of Homicide in Canada

Fixed-effects time series cross sectional (TSCS) models are employed in order to examine how changes in the independent variables over time relate to changes in the homicide rate over time within each region. The creation of 30 time points in each of 7 regions resulted in a region-year sample of 210. By using fixed-effects models, regions are effectively being compared to themselves over time by calculating the deviations of each observation from the region specific mean of all time periods for each variable (Johnston and DiNardo 1997). The fixed-effects model has the advantage of controlling for all unmeasured time-invariant variables within each region. It does this by imitating a different intercept for each region based on its time invariant effects, or stated differently, it simulates the inclusion of a dummy variable for each region in a pooled OLS regression model. Thus, the model implicitly controls for time invariant covariates (Johnston and DiNardo 1997). One of the potential limitations of the fixed-effects model is that it is difficult to make inferences beyond the data values of the independent variables in the sample; however, such problems are minimized in cross-regional studies such as this one where the sample being analyzed contains much variation across both time and region (and variation of the independent variables) for which the results are to be generalized.

In contrast to the random-effects method used often in panel analyses in sociology (Halaby 2004), the fixed-effects option holds stable any unchanging case attributes by entering separate case-specific dummy variables in models (Jacobs and Tope 2008). Such estimates are unbiased when unmeasured time-invariant provincial characteristics associated with the explanatory variables influence the dependent variable. For example, unmeasured but stable explanatory factors such as cultural features which differ between cases yet do not change cannot bias fixed-effects results. Compared to random-effects, considerably stronger claims can be made that omitted variable bias is not present in fixed-effects models (Johnston and DiNardo 1997). The fixed-effects cross sectional time series equation is expressed as:

$$Y_{it} = \alpha + \chi_{it}\beta + v_i + \varepsilon_{it}$$

Where Y_{it} is the homicide rate in region i at time t. α represents the model intercept and β represents the estimates for the parameters for χ_{it}. v_i denotes the region specific residual which varies across region but not over time. The model residual is denoted with ε_{it} and captures random variation within region over time. Overall, this estimator is sensitive to measurement error, and because fixed-effects models ignore any cross case variation, such models only capture the effects of within case changes (but these changes need not be constant from one year to the next). This implies that all time invariant effects are automatically eliminated and thus held constant in fixed-

effects models (Johnston and DiNardo 1997). Each element in an explanatory variable need only vary over time in some cross-sectional units. However, in order to determine if one should use fixed or random effects models, the Hausman test is generally utilized. The Hausman tests show whether random-effects estimates are inconsistent, thereby indicating which method should be used. In this case, the Hausman test indicated that fixed-effects were the appropriate method. This is not surprising given the small N and large T characteristics of the data (as demonstrated by Podestà 2000).

Results

As previously indicated, the homicide rates in Canada vary across time and region, and western Canada exhibits higher rates than does eastern Canada. Overall, the homicide rate has declined since the mid-1970s. However, rates in the Prairie Provinces (Manitoba, Saskatchewan, and Alberta) are currently the highest in the country. The Maritimes, or Atlantic Canada, which include Nova Scotia, New Brunswick, Prince Edward Island, Newfoundland and Labrador, almost consistently demonstrate the lowest homicide rates in the country; they are, however, followed closely by the most populous province Ontario (ON).

Quebec's (QC) homicide rate has seen a relatively consistent decline over the time of study and the rate is currently similar to that of Ontario's rate.

All independent factors also vary over time and space. Table 1 outlines the descriptive statistics for each covariate in Canada and also describes the overall standard deviations, the spatial standard deviations and the temporal standard deviations. The mean homicide rate for Canada is 2.56 per 100,000 with a regional standard deviation of .70 and a .60 standard deviation over time. Unemployment (mean of 8.63) and inequality measured with the gini coefficient (mean of .40) are the measures of economic strength and resource allocation respectively. Social disorganization is measured in two ways: first, by crude divorce rate, and second by crude migration rate with means of 25.12 per 1,000 and 15.43 per 1,000 respectively. The central focus of the independent variables is the percentage of young males, which is a mean of 12.3%; although the temporal standard deviation is 1.7%, the spatial standard deviation is only 0.5% indicating limited variation in proportion of young males over the various regions.

Table 1:
Descriptive Statistics for Dependent and Independent Variables (1976-2005)

Variable	Mean	Total Standard Deviation	Spatial Standard Deviation (n=7)	Temporal Standard Deviation (n=30)
Homicide Rate per 100,000	2.555	0.861	0.696	0.569
Unemployment rate working pop.	8.633	2.93	2.478	1.816
Inequality gini	0.398	0.018	0.007	0.017
Crude divorce rate per 1,000	25.12	5.311	4.196	3.611
Crude migration rate per 1,000	15.429	8.612	7.68	4.834
Population density per sq km	4.166	2.54	2.669	0.562
Population age structure prop male 15 to 29	0.123	0.018	0.005	0.017

In order to determine the effects of structural changes on homicide rates, this fixed-effects analysis begins by estimating a general model of regional Canadian homicide rates outlined in Table 2. First, the socio-economic factors are run in Model 1 without the demographic variable. All factors are significant with the exception of the density control variable, a factor which as indicated above does not appear to have the same effect in Canada as in the

United States[8]. Increases in unemployment rates result in increases in homicide rates, whereas increases in inequality rates result in decreases in homicide rates. This result supports the argument that an expanding economy will decrease homicide rates, but does not support the theory that poor resource allocation increases homicide rates. The social disorganization features show contradictory results in this model. Divorce rate, which is

often demonstrated as having a positive impact on rates of violence, actually indicates the opposite. More specifically, when the divorce rate increases, the violence rate decreases. However, migration rate does show positive significant results: increases in migration rates give rise to increases in homicide rates.

Model 2 displays the effects of the addition of the proportion of young males. Goodness of fit criteria indicate that the model including young males is a better fit than excluding them (chi-square = 14.37). There are now only two significant findings: first, increases in migration rates continue to be associated with increases in homicide rates; however, no other socio-economic factors remain significant. Second, increases in the proportion of young males have a significant positive impact on changes in homicide rates. The estimate suggests that a one percent rise in the young male population size results in a 0.147 increase in the homicide rate. These results lend support to the demography-violence arguments, as increases in the young male segment results in increases in Canadian regional homicide rates.

Because a goal of this research is to explore the interaction between demography and socio-economic factors, the fact that many socio-economic variables are not significant with the addition of the demographic factor is thought to be a function of this interaction. Model 3 displays the effects of the interaction between young males and deprivation factors: it outlines the young male-inequality interactions. Goodness of fit criteria indicate that this model is a better fit than the full model (chi-square = 6.33). Although not shown here, the interaction between young males and unemployment was tested and is not significant. Contrary to results in Model 1, and as indicated by Blau and Blau (1982) and Gartner (1990), unemployment is not an important predictor for homicide as it does not capture deprivation. The inequality-demography interaction is significant, showing that the combination of both unequal resource access changes and changes in proportion of young males in a region strongly influence homicide rate variations. The effects of demographics on homicide differ depending upon the levels of inequality, indicating that the effect of the young male segment on homicide is mediated by rates of inequality.

Model 4 displays the interaction between demographics and one of the social disorganization factors. Goodness of fit criteria indicate that this model is a better fit than the full model (chi-square = 6.33). Not displayed here is the divorce rate-demography interaction as it was not significant. Divorce rates do not appear to interact with demographics, a finding contrary to research conducted by Phillips (2006) who did find a significant interaction in her examination of United States counties. The interaction between young males and migration indicates a significant negative interaction. The effects of

young males on homicide are altered by changes in migration rates. Migrating young males or a pre-existing segment of young males coupled with changing levels of migration interact in their effect on homicide rates.

Although not displayed here, a model was run with both interaction effects. The inclusion of both demography-migration and demography-inequality interactions demonstrate that the interaction of percentage male and migration rate is significant and the interaction of percentage male and inequality is not. This illustrates that the demography-migration factor is robust with the inclusion of the demography-inequality factor.

In order to better understand the interaction effects of young males and inequality as well as young males and migration rates, predicted homicide rate values were calculated and are presented in Table 3 and Table 4. Table 3 shows the predicted homicide rates for the interaction values of young males and inequality and can be interpreted as any one cell being the predicted homicide rates given the row-column values for the gini coefficient and proportion of young males. The values for both factors display the approximate range experienced in Canada over the period of study.

The relationship between young males and rates of inequality is complex. At all levels of inequality the proportion of young males has an increasing affect on predicted homicide rates. However, at low levels of young males in a population, we see a decreasing effect of inequality on homicide rates. Yet once the young male population reaches 12% the increasing gini coefficients begin to have a positive effect on homicide rates. Therefore, the values of proportion of young males must be over a certain point for inequality to impact homicide rates in the expected way: the positive affect of poor resource allocation requires a minimum proportion of young males in a region.

Table 4 displays the predicted values for homicide rates for different values of young males and migration rates. Again, the approximate range of existing values for both migration and young males are used. At all levels of migration, the increasing proportion of young males in an area has an increasing effect on expected homicide rates. The highest predicted homicide rates though are when migration rates are low and the proportion of young males is high (top right quadrant). This runs contrary to ideas of social disorganization as migration influxes are a primary proxy for high levels of transiency and heterogeneity, yet here it appears that the young male segment is driving the interpersonal violence rates and that migration rates may actually temper this influence.

	Model 1		Model 2		Model 3		Model 4	
	B	**SE**	**B**	**SE**	**B**	**SE**	**B**	**SE**
Table 2:								

Table 2:
Fixed Effects Models for Homicide Rates in Canada 1976 to 2005 (N= 210)

	Model 1		Model 2		Model 3		Model 4	
	B	**SE**	**B**	**SE**	**B**	**SE**	**B**	**SE**
constant	5.932***	1.416	0.440	2.011	16.577*	8.549	-1.843	2.193
MAIN EFFECTS								
Economic Indicators								
Unemployment Rate	0.055**	0.024	0.032	0.024	0.020	0.024	0.031	0.023
Inequality (Gini)	-8.505**	3.521	1.090	4.270	-40.080*	21.627	3.049	4.292
Social Disorganization								
Divorce Rate	-0.028**	0.012	-0.016	0.012	-0.020	0.012	-0.011	0.012
Migration Rate	0.039***	0.009	0.019*	0.010	0.017	0.010	0.103***	0.036
Demographic Control								
Population Density	-0.086	0.097	-0.069	0.094	-0.021	0.097	-0.036	0.094
Population Age Structure								
Proportion Male 15 to 29			14.651***	3.922	-118.121*	68.504	22.729***	5.087
INTERACTION EFFECTS								
Proportion Male 15 to 29* Inequality Rate					340.807*	175.555		
Proportion Male 15 to 29* Migration Rate							-0.527**	0.215
R-square within		0.258		0.307		0.320		0.328
rho		0.689		0.649		0.668		0.672
BIC		327.750		318.727		320.074		317.743
AIC		307.667		295.297		293.297		290.966
- 2 log likelihood		-147.834		-140.648		-138.649		-137.483

*p<0.10; **p<0.05; ***p<0.01*

Table 3
Predicted Homicide Rates by Inequality Levels and Proportion of Young Males
With All Variables at Their Mean.

Gini Coefficient	Proportion of Young Males								
	0.09	**0.10**	**0.11**	**0.12**	**0.13**	**0.14**	**0.15**	**0.16**	**0.17**
0.360	1.891	1.937	1.982	2.028	2.074	2.119	2.165	2.211	2.256
0.370	1.797	1.877	1.956	2.036	2.116	2.196	2.275	2.355	2.435
0.380	1.703	1.817	1.930	2.044	2.158	2.272	2.386	2.500	2.614
0.390	1.609	1.757	1.905	2.052	2.200	2.348	2.496	2.644	2.792
0.400	1.515	1.697	1.879	2.061	2.243	2.425	2.607	2.789	2.971
0.410	1.420	1.637	1.853	2.069	2.285	2.501	2.717	2.933	3.149
0.420	1.326	1.577	1.827	2.077	2.327	2.577	2.827	3.078	3.328
0.430	1.232	1.517	1.801	2.085	2.369	2.654	2.938	3.222	3.506
0.440	1.138	1.457	1.775	2.093	2.412	2.730	3.048	3.367	3.685

Table 4

Predicted Homicide Rate by Migration Levels and Proportion of Young Males With All Variables at Their Mean.

Migration Rate (per 1,000)	Proportion of Young Male								
	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17
5	2.627	2.860	3.094	3.327	3.561	3.794	4.027	4.261	4.494
10	2.539	2.752	2.965	3.177	3.390	3.602	3.815	4.027	4.240
15	2.452	2.643	2.835	3.027	3.219	3.410	3.602	3.794	3.985
20	2.364	2.535	2.706	2.877	3.048	3.218	3.389	3.560	3.731
25	2.277	2.426	2.576	2.726	2.876	3.026	3.176	3.326	3.476
30	2.189	2.318	2.447	2.576	2.705	2.835	2.964	3.093	3.222
35	2.101	2.209	2.318	2.426	2.534	2.643	2.751	2.859	2.968
40	2.014	2.101	2.188	2.276	2.363	2.451	2.538	2.626	2.713
45	1.926	1.992	2.059	2.126	2.192	2.259	2.325	2.392	2.459

Discussion

The fluctuating homicide rates in the seven regions of Canada are strongly impacted by changing demographics. As much previous research demonstrates, demographics are a key influencing factor on rates of interpersonal violence (Andresen et al. 2003; Cohen and Land 1987; Fox 2006; Fox and Piquero 2003). Although socio-economic factors have a significant influence in the absence of demographic factors, the addition of young males obscures all but one of these influences. Migration is the only factor that continues to influence homicide rates: migration patterns in Canada affect interpersonal violence rates. Social disorganization levels, which are higher in the western regions of Canada, initially appear to have a direct impact on rates of violence. This may provide a partial explanation for specific homicide trends: geographic fluctuations in migration rates are also higher in the western provinces.

Overall, this analysis shows support for the age-crime relationship at the aggregate level. Larger cohorts of young males will positively influence homicide rates in Canada. The young male subgroup of the population is more likely to engage in higher risk behavior (Gottfredson and Hirschi 1990), and as Gartner (1990) indicates, the younger the population, the more dispersed its activities and the less effective social control is. This result can at least partially explain the overall decrease in the homicide rate: first, the proportion of this segment has also decreased over the period of interest. Second, there have been slight increases in the young male population in the west, where homicide rates are higher.

However, there are likely multiple feedback loops in this equation which may explain some of the complexity in the empirical results. Wilson and Daly (1997) indicate that if a high proportion of people in a given area fall into the high risk category, the time of onset of risky and violent behaviors will be decreased; yet, this relationship is potentially aggravated by contributing factors such as economic fluctuations. Demographics affect homicide rates through socio-economic features: the young male factor, although having a strong influence on homicide rates in this Canadian analysis, is affected by both migration rate changes and changes in inequality. As Phillips (2006) found of counties in the United States, the young male segment of the population interacts with other structural factors. However, counter to Grogger (2006) and Phillips (2006), there was no effect found for the interaction of unemployment and young males on homicide rate changes in this empirical examination.

Resource allocation on the other hand does affect rates of interpersonal violence. On its own, distributive justice does not impact homicide rates in Canada: the distribution of wealth interacts with regional demographic features. Expected rates of homicide begin increasing with increasing inequality only after a point is met for the proportion of young males in a specific region. In fact, if this proportion is not reached, inequality has a decreasing effect on homicide. The positive association of inequality and homicide exists after the young male population reaches 12%. This suggests a cohort effect: as the size of the proportion of young males surpasses a specific proportion of the population, unequal resource distribution begins to play a role. The critical suggestion is that the effect of demographics (which cannot themselves be controlled) on homicide can be tempered by decreasing levels of inequality and perhaps, as Pampel and Gartner

(1995) suggested, the implementation of social institutions which can bring about more equitable access to resources.

As indicated, social disorganization does appear to affect homicide rates on its own, as illustrated by the positive effects of migration rates, or by interacting with the young male segment. Social disorganization implies that the informal structures that are meant to direct behavior exercise less power over individuals resulting in social breakdown (Silverman and Kennedy 1993). Theory would indicate that disorganizing factors, such as migration, would interact with the young male demographic to intensify its effect on homicide rates. An influx of young males to an area should create a high level of chaos thereby decreasing the capacity for social control.

The interaction between migration and demographics is quite interesting as the relationship appears to be dictated primarily by the proportion of young males. Migration rates are not directing the increases when the proportion of young males is taken into consideration; in fact, it is when the proportion of young males is large and the migration rate is low which produces the highest homicide rates. Initially these results and the expected influence of disorganized social conditions seem at odds; however, since social disorganization is based on the idea of lack of shared values and norms due to breakdown, there could be another explanation. If more youth migrate to areas with many employment opportunities there may be more informal controls (through commitments to work) and therefore less frustration, resulting in lower levels of interpersonal violence. It is possible this would not be captured by unemployment rates per se, but rather by proportion of jobs created in a particular region or age specific employment rates. This complex issue requires further attention. Job market increases and employment rate increases for young males could possibly temper the positive effects of social disorganization factors on rates of violence.

There are, of course, limitations to the current study. First, the use of regions as the units of analysis can lead to inappropriate generalizations. Canada is an extremely heterogeneous country and there are many distinctions not only between regions/provinces but within as well. For example, the largest and most populated province, Ontario, likely has huge intra-provincial discrepancies in all measure of both independent and dependent factors. The province contains multiple diverse cities as well a vast rural area. These areas would be substantially different with regards to demographics and socio-economic features. In addition, it is not only Ontario which contains such diversity, but most of the provinces in the country. Future research should attempt to include examinations of these complex relationships with finer units of analysis, perhaps CMA as the focus, if data on all structural features are made available.

Second, a drawback to TSCS data is that they need to be perfectly balanced prior to completing any analysis and certain aggregate level data are not often updated in Canada, for example during the data collection period, divorces had not been updated since 2005 which limited the analysis to that year. Third, TSCS fixed effects cannot deal with spatial autocorrelation in the error term, which could be a problem for this examination. That is, some factors in adjoining regions will be impacted by one another.[9] Geographical proximity to violence has been demonstrated as affecting an area's own violence levels at the community level (Griffiths and Chavez 2004), a factor which cannot be controlled for in this analysis.

Finally, fixed-effects analysis cannot control unobserved time varying heterogeneity, and given that this analysis uses a 30 year time period this is likely an issue. Nevertheless it is important to note that, although not illustrated here, when decade dummy variables were created there were no significant coefficients and when shorter series (10 years) were created there were no significant differences from the overall results[10]. Although fixed-effects can control for time invariant covariates, the omission of relevant time varying factors remains problematic for this type of analysis. Therefore, future research should perhaps attempt to include other relevant factors such as a measure of poverty which could uncover another layer of complexity to the relationship between deprivation and demographics. However, access to information, even at the aggregate level, is restricted in Canada which can make these types of analyses extremely difficult.

Conclusion

The preceding analysis and discussion outlines the complicated relationships between demographic features and social-structural factors on interpersonal violence and adds significantly to our understanding of homicide rate changes in Canada. Despite the limitations, this analysis improves our understanding of some important relationships in criminology. In examining the broad strokes at the regional/provincial level, demographics remain a key indicator for homicide changes: as the size of the young male population between 15 and 29 increases, regions are more at risk of increasing violence. Although not tested in this examination, young males are more likely than other sectors of society to experience the brunt of socio-economic features, an important factor to consider in future research. The young male factor's influence on homicide rates is thought to be essential in Canada (Andreson et al. 2003). This relationship, though, is not straight forward as it appears to be both tempered and aggravated by socio-demographic factors.

While the strength of the association between demography and violence remains, the ubiquity of the demographic-violence relationship comes into question through this analysis. As Gartner (1990) also found, this feature interacts with other structural influences. Although,

previous research indicates these interactions exist, it was either derived from the United States (see Phillips 2006) or the relationships were examined cross-nationally on multiple developed nations (see Gartner 1990; Pampel and Gartner 1995). This examination of Canadian regions supports the complexity of the interaction between young males and socio-economic factors and their combined effect on homicide rate changes. Although the relationship between age and crime is well established at the individual level, the current interactions demonstrate a complex relationship at the aggregate level in Canada.

The relationship demonstrated here between socio-economic factors in combination with demographics on homicide would benefit from other types of analyses into the Canadian case. Wilkinson (2006) indicates that unequal access to resources breaks down community relations; however, exactly how these factors come together to effect wellbeing and interact with demographics cannot be explicated completely. In addition, migration and divorce as proxies for social disorganization would benefit from the addition of measures of heterogeneity or transiency. Finally, there may be other cofactors which could influence the young male segment and homicide rate changes, such as poverty, age-specific employment rates or shifting economic conditions, all of which should be considered in future research into changing homicide trends in Canada.

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Endnotes

[1] This long-term trend is cited as decreasing by a factor of no less than ten to one since the 13th century (Gurr 1981).

[2] Differences in homicide rates in Canada and the United States have been examined by a number of researchers (see Hagan 1991; Ouimet 1999; Zimring and Hawkins 1997).

[3] This statement holds with the exception of the northern territories where the homicide rate has been known to exceed that of the United States at times. Nunavut, Yukon, and the Northwest Territories have both high and volatile homicide rates. This is largely a result of the extremely sparse population, a factor that inflates homicide rates during certain periods. The territories are not included in this analysis, but this geographical area does require further attention given the volatility of both structural factors and homicide rates.

[4] There are also issues of race, which can be an important demographic aspect for homicide rates. In the United States, young black males are disproportionately represented overall as both homicide victims and offenders (Blumstein 2006). In Canada, it is native Canadians who are overrepresented in these groups (Silverman and Kennedy 1993); however, there is some difficulty with the issue of race owing to a lack of transparency in Canadian reporting methods (see Wortley 2003). Racial statistics are not collected in homicide reports with the exception of being identified as native, and even these data are incomplete. It is almost impossible to statistically examine the role young black males play in Canadian homicide rates, with the exception of one rare study. Ouimet (1999) studied the results when police in Montreal coded the race of all victims of homicide in 1993; the homicide rate for blacks was 24 per 100,000, while the rate for non-blacks was under 3 per 100,000. Regardless of this important finding, it is not possible to include race as a variable in the present analysis owing to limitations in the data.

[5] Furthermore, Canadian Centre for Justice Statistics (CCJS) did not collect city level identifiers prior to 1991and many of the macro-level socio-economic variables are not available at the city level.

[6] Data derived from CANSIM were accessed through McGill Library the reproduction is a copy of an official work that is published by the Government of Canada and the reproduction has not been produced in affiliation with, or with the endorsement of the Government of Canada.

[7] Cohort size is measured differently by various researchers, the entire range for the young population covers from age 15 to age 34. This research follows Gartner's (1990) choice of 15 to 29 years of age. One should be cautious when comparing studies that use different cohort definitions (see Leenaars and Lester 1996 for further discussion of cohort sizes).

[8] It is important to note that city level data could potentially show otherwise.

[9] See Worrall and Pratt (2004) and Phillips (2006) regarding spatial autocorrelation in TSCS fixed-effects models.

[10] See Appendix A for the inclusion of time period dummy variables.

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Appendix A: Period Effects on Homicide Rates in Canada 1976 to 2005 (N= 210)		
	Model 1	
	B	**SE**
constant	-0.012	2.098
MAIN EFFECTS		
Economic Indicators		
Unemployment Rate	0.040	0.029
Inequality (Gini)	1.599	4.576
Social Disorganization		
Divorce Rate	-0.026	0.016
Migration Rate	0.021*	0.011
Demographic Control		
Population Density	-0.097	0.100
Population Age Structure		
Proportion Male 15 to 29	19.485***	6.641
DECADE (1996-2005 ref)		
1976-1985	-0.205	0.269
1985-1995	-0.017	0.143
R-square within		0.310
rho		0.658
*$p<0.10$; **$p<0.05$; ***$p<0.01$*		

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