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Community, Strain, and Delinquency: A Test of a Multi-Level Model of General Strain Theory[1]

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ABSTRACT

Although general strain theory was initially advanced as a micro-social theory, Agnew (1999) has recently proposed a macro-social version of the theory. Agnew's macro-social general strain theory predicts that community differences, including racial and economic inequality, influence levels of community strain, which may then lead to higher crime rates. However, Agnew's explications of the macro-level model strongly suggest that a multilevel integrated theory of general strain is also appropriate. Using data from 430 students attending high school, this study investigates the degree to which community characteristics influence individual levels of strain, negative affect, and delinquency and whether the effects of strain on individual delinquency are more salient within communities characterized by higher levels of inequality. Results from a hierarchical linear model of high school students (level 1) within 2000 US Census block groups (level 2) does not support the multilevel model of general strain theory. However, supplementary contextual analysis reveals that there are community differences regarding the strain-anger-delinquency relationships among high school students.

KEYWORDS: general strain theory; delinquency; community; multi-level analysis.

In recent years, interest in strain theory has been revived with ever increasing breadth. Many tests of strain theory remain true to the hypothesis of earlier versions of strain theory (Merton 1938; Cohen 1955; Cloward and Ohlin 1959, 1961) that structural strain is considered a cause of crime/delinquency. Agnew's (1992) revision of strain theory into a more general strain theory shifted the focus from social structural to social psychological (Broidy 2001), thus alleviating much of the criticism plaguing earlier versions. Agnew's greatest contribution from this revision of strain theory has been an explication of the factors that condition the strain-crime relationship. In addition to expanding the scope of sources of strain, Agnew and others have attempted to increase the comprehensiveness of other processes involved in strain theory. These expansions have provided more specification on criminal motivation within the strain-crime relationship (Agnew 1992), specification of types of strain (Agnew 2001), an examination of gender differences (Broidy and Agnew 1997), and the consideration of structural effects which condition the strain-crime relationship (Agnew 1999), even, life-course (Agne, 1997) and biological related aspects of strain (Walsh 2000). Some of these theoretical "elaborations" (Wagner and Berger 1985) or expansions of general strain theory have received very limited or no empirical testing (e.g., structural, life-course, biological).

Often expansions of strain theory have been guided by statements and findings made in previous studies (e.g., Agnew 1983, 1984, 1985). In his recent theoretical presentation of a structural/macro version of general strain theory, Agnew (1999: 128) argues that:

> community characteristics will have a significant direct effect on individual crime after individual-level variables are controlled. Communities also have an indirect effect on strain by influencing individual traits and the individual's immediate social environment.

While the structural/macro version of general strain theory (Agnew 1999) was not explicitly advanced as a multilevel explanation of the effect of strain on crime, this statement raises the tantalizing possibility that general strain theory may also be conceptualized and empirically tested as a multilevel integrated theory. It is this possible expansion of strain theory that the present study explores.

Initially developed as a micro-level social psychological theory, Agnew's (1992) general strain theory (GST) hypothesizes that crime and delinquency result from certain adaptations to strain. Agnew defines strain as "negative or aversive relations with others" (Agnew 1992: 61). General strain theory delineates three major types of strain that may lead to deviant behavior (Agnew 1992: 59): failure to achieve positively valued goals, removal of positively valued stimuli, and presentation of negative stimuli. Agnew posits that an individual will experience at least one negative emotion, *negative affect*, per experience of strain. These negative emotions may span a broad spectrum ranging from depression to anxiety to despair. However, Agnew argues that anger, one of the most potent reactive emotions, producing a desire for retribution, may be key to strain-induced deviance (Agnew 1992).

Whether or not negative affect leads to an illegitimate response depends on individual coping strategies. Agnew describes three forms of coping strategies: cognitive, emotional, and behavioral (Agnew 1992: 69). In addition to coping strategies, Agnew discusses internal and external factors that may condition the effects of strain. These conditioning factors range from environmental variables and the nature of social support structures to individual characteristics such as temperament, intelligence, and beliefs (Agnew 1992: 70-73). The form of an individual's coping strategy conditioned by environmental and personal factors directly affects how the individual will adapt to strain.

Several studies have provided empirical support for the propositions Agnew has set forth in general strain theory. A significant positive relationship between various strain measures and delinquency has been reported (Agnew 1985, 1989, 2002; Agnew and Brezina 1997; Agnew and White 1992; Aseltine, Gore, and Gordon 2000; Baron and Hartnagel 1997; Brezina 1998, 1999; Broidy 2001; Capowich, Mazerolle, and Piquero 2001; Eitle and Turner 2003; Hoffmann and Cerbone 1999; Hoffmann and Miller 1998; Hoffmann and Su 1997; Maxwell 2001; Mazerolle 1998; Mazerolle, Burton, Cullen, Evans, and Payne 2000; Mazerolle and Maahs 2000; Mazerolle and Piquero 1997, 1998; Mazerolle, Piquero, and Capowich 2003; Paternoster and Mazerolle 1994; Piquero and Sealock 2000).

On the other hand, empirical studies of the indirect relationship between strain and delinquency, when mediated by negative affect, have been less consistent. Strain has been significantly associated with anger or negative affect (Agnew 1985; Agnew, Brezina, Wright, and Cullen 2002; Aseltine et al. 2000; Bao, Haas, and Pi 2004; Benda and Corwyn 2001; Brezina 1996, 1998; Capowich et al. 2001; Hay 2003; Jang and Johnson 2003; Mazerolle and Piquero 1997, 1998; Piquero and Sealock 2000), but the direction and role of anger as a mediating variable on certain types of delinquency is unclear. For example, some findings have suggested that anger may be limited in its role as a mediator for the strain-delinquency relationship to measures of violence or interpersonal aggression only, not acts of non-violent behavior (e.g., property crimes) or substance use (Aseltine et al. 2000; Piquero and Sealock 2000). Moreover, Mazerolle and associates (2000) demonstrate that it is actually strain that mediates the relationship between anger and delinquency. Another study conducted by Mazerolle and associates (2003) suggests that differences in the types of anger (i.e., situational versus trait) may explain some of these inconsistencies. Other studies (Aseltine et al. 2000; Bao et al. 2004; Broidy 2001; Hay 2003; Piquero and Sealock 2000) have examined alternative measures of negative affect, such as anxiety, depression, resentment, and guilt, and found mixed results.

Empirical research examining forms of individual coping strategies, posited to directly affect how the individual adapts to strain, have also lacked empirical consistency. These studies include measures of conditioning factors of the strain-delinquency relationship such as self control, self-esteem, self-efficacy, delinquent peers, family communication, moral beliefs, religiosity, and social support (Agnew and White 1992; Aseltine et al. 2000; Capowich et al. 2001; Eitle and Turner 2003; Hay 2003; Hoffmann and Cerbone 1999; Hoffmann and Miller 1998; Jang and Johnson 2003; Mazerolle and Maahs 2000; Mazerolle and Piquero 1997, 1998; Paternoster and Mazerolle 1994; Peter, LaGrange, and Silverman 2003; Piquero and Sealock 2004).

Although most tests of general strain theory have followed Agnew's (1992) initial micro-level statement of the theory, Agnew has continued to elaborate the general strain theoretical model. Recently, Agnew (1999) proposed an expanded version of general strain theory that provides macro-social implications for explaining crime (referred to as MST henceforth). In this new theoretical elaboration, Agnew proposes a model that uses GST to help explain differences in crime rates within differing communities. Agnew argues that structural community characteristics (e.g., economic deprivation, high inequality, etc.) lead both directly and indirectly to high crime rates. While he

acknowledges the ability of other theories (e.g., social disorganization and subcultural deviance) to explain crime rates and inference to a relationship between community differences in crime and strain, he contends these theories have been lacking in their explication of motivational processes of crime (Agnew 1999: 126). Therefore, Agnew presents MST as a supplemental element to other macro-social theories of crime; one that addresses the motivational aspect while acknowledging other influences like social control and subcultural values (see social disorganization and subcultural deviance theories) (Agnew 1999: 147).

Agnew suggests that variation in the propensity to commit crime within disadvantaged communities depends on the "strainful" experiences of individuals within these communities (Agnew 1999: 125). According to MST, the variation in community crime/delinquency rates indirectly depends on the levels of aggregate strain, aggregate negative affect/anger, and other stressful community conditions (for a description of the sources of strain, anger, and other conditioning variables within the community, see Agnew 1999). Communities characterized as highly disadvantaged create strain and anger by blocking community members' abilities to achieve positive goals, creating a loss of positive stimuli, exposing members to negative stimuli, and increasing overall relative deprivation (Agnew 1999:126-130). Moreover, MST suggests that disadvantaged communities are more likely to select and retain strained individuals and have higher levels of angry individual interaction than communities less disadvantaged (i.e., interpersonal-friction argument (Brezina et al. 2001)).

There have been very few tests of MST. Warner and Fowler (2003) recently examined MST using neighborhood level data, defined by 1990 US Census block groups, and aggregated individual surveys. Their findings showed mixed support for the model. Specifically, their study found neighborhood levels of disadvantage and stability significantly affected neighborhood strain, and neighborhood strain was positively associated with neighborhood violence. However, this relationship was not moderated by a conditioning factor of neighborhood informal control. Hoffmann (2002) conducted a contextual, multilevel analysis of differential association, social control, and strain theories using 1990 US Census characteristics aggregated to the zip code level and individual level data for tenth graders drawn from the National Educational Longitudinal Study (NELS). Their results indicate strain, as measured by individual negative life events and monetary strain, predicts delinquency behavior among youths. Community (zip codes) characteristics significantly affected delinquency; however, this relationship was not mediated by individual-level variables. Brezina et al. (2001) have also provided a multilevel test of MST using school-level and individual-level data obtained from two waves of the Youth in Transition (YIT) data set. They tested the effects of anger, school commitment, and values in favor of aggression on aggressive/disruptive student behavior, controlling for race, family stability, residential stability, socioeconomic status, and school size. Their results provided partial support for a multilevel version of general strain theory. School-level anger significantly, positively affects student conflicts with peers, but not student aggressive behavior. They observed that students were more likely to display aggressive behaviors toward other students when the overall school anger level was high. Hoffman and Ireland (2004) provide the last multilevel test of MST. They used school-level and individual level data from the National Education Longitudinal Study (NELS) data. Their test examined the conditioning effects of illegitimate opportunity structures on the strain/stress-delinquency relationship. They found that their measures of strain and stressful life events influenced changes in both adolescent involvement in delinquency and in adolescent self-concept over time. However, these relationships were uniform across illegitimate opportunity structures, suggesting little to no evidence of the multilevel conditioning effects implied by MST.

The study proposed here examines the efficacy of MST as a means to predict individual differences in both strain and anger as outcomes of community-level characteristics and to condition their influence on delinquency. Similar to Brezina et al. (2001) and Hoffmann (2002), the proposed study utilizes a multilevel approach. However, the proposed study includes measures of both strain and anger.

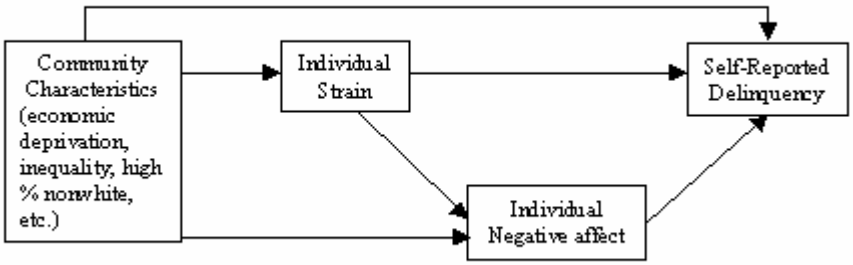
THE PRESENT STUDY

Although Agnew's (1999) MST is modeled strictly at the macro-social level, a multilevel approach to a general strain theory of crime is also tenable (Brezina et al. 2001). Indeed, Agnew argues that:

> community characteristics will have a significant direct effect on individual crime after individual-level variables are controlled. Communities also have an indirect effect on strain by influencing individual traits and the individual's immediate social environment (Agnew 1999: 128).

In addition, Agnew states, "Crime rates are an aggregation of individual criminal acts, so these [macro] theories essentially describe how community-level variables affect individual criminal behavior." (Agnew 1999: 123). Based on these statements, this study examines the degree to which community characteristics influence individual levels of strain, negative affect, and delinquency and whether the effects of strain and

Figure 1. A Multilevel Model of Community Difference and Individual Self-Reported Delinquency.



negative affect on individual delinquency are more salient within communities characterized by higher levels of social and economic disadvantage.

Similar to Agnew's (1999: 129) model of community differences and general strain, Figure 1 predicts relationships between community characteristics, strain, negative affect, and delinquency. Unlike Agnew's macro-level model, strain, negative affect, and crime are measured at the individual level. Figure 1 attempts to explain how disadvantaged communities interact with an adolescent's ability to cope with strain. This exploratory model only considers the motivation for individual crime, not differences in social control and subcultural values; thus representing a conservative test of a multilevel version of MST.

The model presented in Figure 1 poses one overall question: do the effects of individual strain and negative affect on self-reported delinquency vary by neighborhood context? Although not exclusive to the theoretical tenants of MST, community characteristics may directly affect crime/delinquency. Despite predictions from many venerable theories of crime for a relationship between community or structural characteristics and individual crime (cf. Durkheim 1951[1897]; Merton 1968; Shaw and McKay 1969; Colvin and Pauly 1983; Hagan, Gillis, and Simpson 1985; Akers 1998), empirical studies of this relationship have been scarce. Although many of the findings have been weak, empirical studies examining the relationship between structural characteristics and individual delinquency suggest that there is a causal link, both direct and indirect, between the community and the individual (cf. Reiss and Rhodes 1961; Krohn, Lanza-Kaduce, and Akers 1984; Simcha-Fagan and Schwartz 1986; Gardner and Shoemaker 1989; Rosenbaum and Lasley 1990; Gottfredson, McNeil, and Gottfredson 1991; Sampson, Raudenbush, and Earls 1997; Cattarello 2000).

According to MST, community characteristics may also have indirect effects on crime/delinquency. Similar to Agnew's (1999) MST argument, Figure 1 contends characteristics of disadvantaged communities (e.g., economic inequality and racial inequality) contribute to levels of individual strain and individual negative affect. Based on Agnew's GST (1992) assumption that strain and negative affect are major sources of delinquent motivation, individuals within these disadvantaged communities will be more likely to be delinquent. Individual measures of strain may both directly and indirectly lead to individual delinquency. Indirectly, the likelihood that strain will lead to delinquency is mediated by feelings of negative affect, specifically anger, among individuals. As discussed when referring to GST (Agnew 1992), these theoretical micro-level effects of strain have been supported empirically. On the other hand, empirical studies of the indirect relationship between strain and delinquency when mediated by negative affect have been less consistent. Although the findings regarding the role of negative affect are contradictory, the proposed model reflects the theoretical direction suggested by Agnew at both the micro-social and macro-social levels.

Community characteristics may also indirectly affect individual delinquency through negative affect alone. In his discussion of MST, Agnew (1999) stated that disadvantaged communities are more likely to contain higher concentrations of individuals experiencing negative affect/anger. This increases the chance that angered individuals will come in contact with other angered individuals (interpersonal-friction (see, Brezina et al. 2001)). Consequently, individual negative affect may increase individual delinquency.

METHODOLOGY

The research reported here reflects a cross-sectional study examining the causes and correlates of delinquency among high school students from Largo, Florida. Participation in this study was contingent upon compliance with passive parental consent procedures. In addition, students were informed that participation in the study was completely voluntary and that all information provided was confidential and anonymous. Students were surveyed in various types of classes ranging from mainstream to emotionally handicapped

(EH) and gifted classes for grades 9 through 12. Overall, the response rate was 79 percent (n=625) for the high school.

Of the total 625 usable, completed surveys, 462 (74%) were able to be geocoded (discussed below) for the multilevel analysis. In an effort to improve the fit of the data, cases that contained missing values among any of the items used to create the dependent variable were eliminated. Thus, the sample size was further reduced to 430 adolescents for the study. In the subset used in this analysis, the majority of the students described themselves as white (82.3%). The rest of the respondents considered themselves to be black (6.0%), Hispanic (4.2%), Asian (2.6%), or other (3.5%). The geocoded sample was 45.6 percent male and 54.2 percent female. The ages of the students ranged from 13 to 19, with the average age being 15.9 years old. Comparison of the geocoded versus non-geocoded high school students revealed that there were no significant differences between the two groups with regard to the variables employed in our analyses; however, there were significant differences between the two groups with respect to gender (Pearson χ^2=8.346, df=1, p=0.004) and race (Pearson χ^2=7.572, df=1, p=0.006), such that the geocoded subset contained less males and non-whites than the non-geocoded subset. These differences affect the generalizability of the analyses, suggesting it is likely certain demographic groups (males and non-whites) were excluded from the geocoded sample.

Individual-Level Measures

The dependent variable is a summary measure of self-reported delinquency. Students were asked how many times within the past 12 months they had committed the following: (1) gone into or tried to go into a house to steal something, (2) purposely damaged or destroyed property that did not belong to you, (3) stolen another student's property worth $50 or less, (4) stolen other things worth $50 or less, (5) stolen something worth more than $50, (6) gone into or tried to go into a building to steal something, (7) stolen or tried to steal a car or motorcycle, (8) hit someone with the idea of hurting them, (9) attacked someone with a weapon, and (10) used a weapon or force to get money or things from people. Responses for each of these questions were summed to create an additive scale of delinquency (mean=3.75, SD=25.14). A majority of the students (75.3%) said they had committed zero of the ten delinquent acts within the past 12 months. However, because of marked skewness (15.30) and kurtosis (266.81) in the delinquency scale, this variable was logarithmically transformed (mean= -.58, SD= .78), with -1 being assigned to students reporting no delinquent offenses prior to the log transformation (alpha=.39 for unlogged delinquency scale; alpha=.70 for logged delinquency scale).

Strain is measured using five composite variables that comprise measures of the three types of strain (i.e., failure to achieve positive goals (expectations versus achievements and just versus fair outcomes), removal of positive stimuli, and presentation of negative stimuli). Strain as the disjunction between aspirations and expectations, another sub-category of strain as the failure to achieve positive goals, was not included in the measures. Although classic strain theory contends that the disjunction between aspirations and expectations is a form of strain that influences delinquency, empirical studies have found little support for this sub-category of strain (e.g., Voss 1966; Hirschi 1969; Liska 1971; Farnworth and Leiber 1989; Burton, Cullen, Evans, and Dunaway 1994). Aspirations reflect distant goals whereas expectations refer to more immediate goals. Since studies have shown that adolescents are more concerned with immediate goals over distant goals (Hirschi 1969; Empey, Lubeck, and LaPorte 1971; Liska 1971; Quicker 1974; Farnworth and Leiber 1989; Burton et al. 1994), the present study included expectations and achievements rather than aspirations and expectations.

To measure strain, students were asked a range of questions concerning their expectations, feelings of inequality and relative deprivation, experience of losses, and presence of negative stimuli. Nine items were used to represent measures of strain as the failure to achieve positive goals. Specifically, to measure strain as the disjunction between expectations and actual achievements, students were asked to specify the degree to which they agreed or disagreed with the following statements: (1) my teachers don't respect my opinions as much as I would like, (2) people my age treat me like I'm still just a kid, and (3) my parents don't respect my opinions as much as I would like. Responses ranged from 1 = strongly disagree to 4 = strongly agree. Measures of strain as the disjunction between just/fair outcomes and actual outcomes were derived from responses to the following questions: (1) other students get special favors from the teachers here that I don't get, (2) compared to the rules my friends have to abide by, the rules my parents set for me are unfairly strict, (3) among my group of friends, I think I like them more than they like me, (4) even though I try hard, my grades are never good enough, (5) even though I work hard, I never seem to have enough money, and (6) no matter how responsible I try to be, my parents don't trust me to do things on my own. These responses also ranged from 1 = strongly disagree to 4 = strongly agree. The first two items of the just/fair outcomes represent notions of relative deprivation, in which students compare their own situation to that of others; while the remaining four items assess the degree of inequity in

exchange relationships, where students compare their "inputs" with the "outputs" of their relationships with others.

All nine items measuring strain as the failure to achieve positive goals were entered into a principal axis factor analysis, using mean substitution (ranged from 0.7% to 2.3% missing among items). This analysis identified a two-factor solution with eigenvalues greater than 1.0 among these 9 predictor variables—accounting for 44 percent of the variance. Loadings for these two factors were moderate in size, ranging from 0.32 to 0.68. These factors were Oblique rotated (factor correlation= -.492) for factor clarity. Regression factor scores (Kim and Mueller 1978) of these two Oblique rotated factors are included as predictor variables in the analyses. The first factor reflects unfair teacher/peer relationships (alpha=.60), while the second factor reflects unfair parent relationships (alpha=.69). The second factor is negatively correlated with the first and suggests strict parenting styles.

Strain as the removal of positive stimuli was measured by creating an additive index of life losses among several items; however, due to low bivariate correlations (generally r<.100 for excluded items) among some of the items and multicollinearity issues (e.g., "changed schools" with "moved", "divorce" with "parent moved out or away"), only four items are used in this study (correlations ranged from 0.113 to 0.303). Students were first asked whether or not the following things happened to them within the past 12 months: (1) changed schools, (2) parent moved out or away, (3) sibling moved out or away, and (4) lost a friendship. Next the students were asked how much of a problem each event was to them (1 = no problem, 2 = small, 3 = medium, or 4 = large). The additive scale per item was computed by multiplying whether or not each event had occurred (values 0 or 1) by the size of the problem (values 1 - 4).

The four items measuring strain as the removal of positive stimuli were entered into a principal axis factor analysis, using mean substitution (ranged from 1.4% to 2.1% missing among items). This analysis identified a single factor solution with an eigenvalue greater than 1.0 among these 4 predictor variables—accounting for 39 percent of the variance. Loadings for this unrotated single factor were moderate in size, ranging from 0.28 to 0.57 (alpha=.46).

Finally, strain as the presentation of negative stimuli was based on responses to the following statements: (1) there are a lot of bullies at this school, (2) my classmates do not like me, (3) I worry a lot about being beaten up at school, (4) I worry a lot about being shot at school, (5) there are a lot of strangers coming and going in my neighborhood who don't live there, (6) I feel safe being inside my home at night, (7) I feel safe being alone outside in my neighborhood at night, and (8) the people living in my neighborhood take good care of the way the neighborhood looks. These responses ranged from 1 = strongly agree to 4 = strongly disagree (responses to the first four items were reverse coded).

All eight items measuring strain as the presentation of negative stimuli were entered into a principal axis factor analysis, using mean substitution (ranged from 0.7% to 1.9% missing among items). This analysis identified a two-factor solution with eigenvalues greater than 1.0 among these 8 predictor variables—accounting for 55 percent of the variance. Loadings for these two factors were modest in size, ranging from 0.47 to 0.87. These factors were Oblique rotated (factor correlation= .442) for factor clarity. Regression factor scores (Kim and Mueller 1978) of these two Oblique rotated factors are included as predictor variables in the analyses. The first factor reflects negative peer relationships (alpha=.71), while the second factor reflects negative neighborhood conditions (alpha=.71).

Negative affect was the second construct examined at the individual level. Students were asked to indicate how often the following statements described them. (1) I feel annoyed when people don't notice that I've done good work, (2) when I get mad, I say nasty things, (3) it

Table 1. Descriptive Statistics for Individual Level and Community Level Variables.

	Minimum	Maximum	Mean	SD
Individual Variables				
Strain: Failure positive 1 (F1)	-2.107	2.495	.000	.829
Strain: Failure positive 2 (F2)	-2.203	1.689	.000	.838
Strain: Removal positive (RP)	-.685	2.535	.000	.722
Strain: Pres. negative 1 (N1)	-1.173	3.644	.000	.912
Strain: Pres. negative 2 (N2)	-1.440	2.713	.000	.861
Negative affect (Index)	7	32	19.342	4.452
Delinquency	0	463	3.75	25.137
Log Delinquency (Index)	-1.000	2.666	-.581	.781
Community Variables				
Community disadvantage	-1.321	4.946	-0.019	0.776

makes me very mad when I am criticized in front of others, (4) when I get frustrated, I feel like hitting others, and (5) I feel furious when I work hard but get a poor grade. These items were derived from the Spielberger (1988) State-Trait Anger Expression Inventory (STAXI), which examines anger as a personality trait that is situational. In addition, students were asked how often they think the following: (1) it makes me mad when people don't let me make my own decisions, (2) it makes me mad that others are able to spend more money than I can, and (3) it makes me mad when I don't get the respect from others that I deserve. These items also represent situations that may lead to feelings of anger. These eight items of trait anger appear to be more situational or reaction oriented (see, Mazerolle and Piquero 1998). Similar to Baron's (2004) examination of strain and anger (negative affect) on crime and drug use among homeless street youth, we created an additive scale of the above eight items to measure negative affect (alpha=.75). Although these items of anger do not represent all forms of trait anger, the situational component of anger appears consistent with general strain theory (Baron 2004: 469).

The mean, minimum, maximum, and standard deviation values for the composite indexes of strain, negative affect/anger, and delinquency are reported in Table 1. On average, the adolescents in this subset of the sample report modest levels of strain and negative affect and low levels of delinquency. Although the average number of total delinquent acts committed by these adolescents is 4 acts per year, this is not an accurate interpretation of the sample. In fact, examination of the data revealed 75 percent of the subset reported committing zero delinquent acts. Obviously, the 11 percent of the sample that reported committing four or more delinquent acts per year greatly affects the mean for the delinquency measure. This was precisely why the delinquency scale was logarithmically transformed, so as to reduce skewness and kurtosis.

Community-Level Data

In this study, community effects were defined by census block groups. Block groups are subdivisions of census tracts containing between 250 and 550 housing units (U.S. Census Bureau 2000). Although most studies of neighborhood effects utilize census data delimiting neighborhood by census tracts, Agnew (1999: 124) suggests that his macro-social general strain theory is better tested with data pertaining to smaller geographical areas, which "are more homogeneous in terms of most of the independent and intervening variables." Likewise, other researchers have advocated for the use of smaller definitions of the community, such as block groups (Brezina et al. 2001; Bursik 1989; Bursik and Grasmick 1993; Hoffmann 2002; Suttles 1972; Tienda 1991).

One purpose of the survey was to provide greater understanding of the connection between the students and their surrounding environments. The survey asked students to provide the street names of the intersection closest to where they lived. Based on this information, block groups could be attributed to each student. Among the 625 high school students who successfully completed the survey, 462 (74%) students also provided a street/cross-street location. Each address was then geocoded using ArcView ("ArcView GIS 3.2 [Computer software]," 1999).

Once the student's address was geocoded, each student was assigned a 2000 US census identification number. This number provided the tract and block group number for that student's location. Due to incompatibilities in geographical map projections, the street maps did not align perfectly with the US Census tract and block group boundaries. This disparity, however, was only problematic for students living on streets comprising the boundaries between adjacent census tracts and block groups. Where individuals lived on boundary streets or intersections (25% of the 462 students), they were randomly assigned to one of the adjacent block groups. Students resided in 108 different block group communities with an average of approximately 4 students per block group.

Measurement of Community Variables

Many of the measures of community characteristics reflect those mentioned by Agnew in his derivation of MST (1999). Several of these have been empirically tested in other multilevel studies (e.g., Avakame 1997; Cattarello 2000; Gottfredson et al. 1991; Warner and Fowler 2003). Six characteristics of disadvantaged communities were obtained from 2000 US Census block group data. Each characteristic is a ratio level variable based on aggregate measures.

The community measures include racial inequality, economic inequality, education, family disruption, and residential mobility. *Non-White* was defined as the proportion of minority population (i.e., black, Asian, American Indian, or other) within each block group; for these block groups blacks comprised the vast majority of non-white residents. *Poverty* referred to the total number of people 15 years old or older with a ratio of income to poverty level for 1999 of less than 1.00. For the 2000 census data, the poverty threshold calculated by the Census Bureau for a family of four was $17,029 (U.S. Census Bureau 2000), excluding monies received by the family from members who were institutionalized, living in group quarters in the military, or living in college dorms. *Low education* referred to the proportion of persons within each block group with less than a high school education or equivalent. *Female-*

Table 2. Zero-Order Correlation Matrix for Individual and Community Level Variables.

		2.	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*
1.	Unfair teacher/peer relations	-.664*	.216*	.370*	.261*	.348*	.116*	.202*
2.	Unfair parent relations		-.123*	-.257*	-.210*	-.368*	-.102*	-.099*
3.	Removal of positive stimuli			.071	.062	.037	.015	.113*
4.	Negative peer relations				.519*	.052	.073	.066
5.	Neg. neighborhood conditions					.129*	.315*	.039
6.	Negative affect						-.011	.230*
7.	Disadvantage							-.052
8.	Delinquency							

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

headed household with children was constructed as the proportion of householders describing themselves as female with no husband present and children under 18 years old. *Residential mobility* represents the proportion of persons within each block group that lived in a different residence four years prior (1995). *Non-home owners* represents the proportion of persons within each block group that did not own (i.e., rented, leased) their residence.

The six items measuring community disadvantage were entered into a principal axis factor analysis. This analysis identified a single factor solution with an eigenvalue greater than 1.0 among these 6 predictor variables—accounting for 59 percent of the variance. Loadings for this unrotated single factor were moderately large in size, ranging from 0.58 to 0.88. Regression factor scores (Kim and Mueller 1978) of the factor is included as a predictor variable in some of the analyses (alpha=.80).

RESULTS

The purpose of this study was to examine a multilevel model of general strain theory. This interest was influenced by the recent introduction of a macro-level model of general strain theory (see Agnew 1999). The question addressed by this multilevel model (see Figure 1) was the following: do the relationships among strain, negative affect, and delinquency differ significantly across communities? Hierarchical linear modeling (HLM) was utilized to examine the effect of community differences on the relationships among strain, negative affect, and delinquency. A two-level HLM was performed on a path model using the Mplus version 3.1 (Muthén and Muthén 2004). This analysis proceeds in two stages: (1) tests the individual level (within) model and (2) tests the community-level (between) model (for detailed discussion of HLM see, Bryk and Raudenbush 1992; Wooldredge et al. 2001).

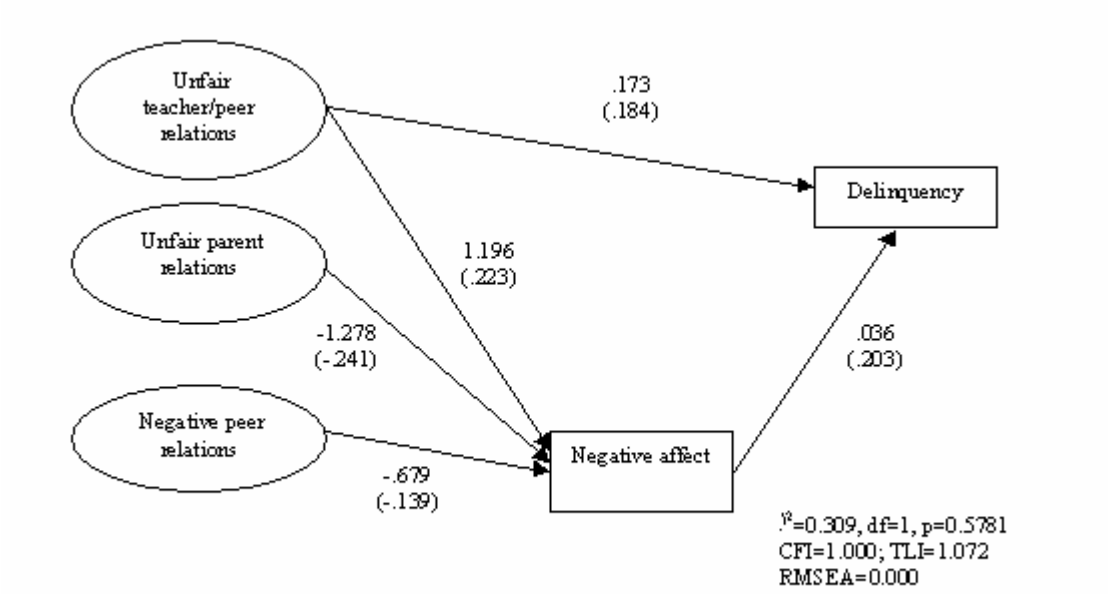
Mplus is a versatile, multivariate statistical modeling program enabling estimation of a variety of models for continuous and categorical observed and latent variables. In these analyses, a χ^2 test is used to test the fit of the models to the data. Lack of significance indicates an acceptable model fit. Mplus also provides a number of descriptive fit measures to assess the closeness of fit of the model to the data. Three fit indices were used to evaluate the model fit, using the following criteria as indicating an adequate fit: (1) the comparative fit index (CFI) (Bentler 1990), (2) the Tucker-Lewis coefficient (TLI) (Tucker and Lewis 1973), and (3) root mean square error of approximation (RMSEA) (Byrne 2001). The typical range for both TLI and CFI is between 0 and 1 (although TLI can exceed 1.0), with values greater than .95 indicating a good fit (Browne and Cudeck 1993; Hu and Bentler 1999). For RMSEA, values at .05 or less indicate a close model fit, and values between .05 and .08 indicating a mediocre model fit (Browne and Cudeck 1993).

Initial examination of bivariate relationships at the individual level found statistically significant relationships among the five factors of strain, negative affect, and delinquency (see Table 2). Most of the bivariate relationships are significant and in the expected direction. However, strain as unfair parent relationships is inversely related to the other four measures of strain, negative affect, delinquency, and community disadvantage. Interestingly, the bivariate relationship between the factor scores of community disadvantage (attributed to individuals for the purposes of data exploration, but not included in the HLM analysis) and negative affect and delinquency are not significant and seem counterintuitive in their direction.

The purpose of a multilevel model of general strain theory (Figure 1) can best be addressed by three questions: (1) do individual strain, negative affect, and delinquency vary within communities, (2) do community characteristics explain any of this variation between communities, and (3) what roles do strain and negative affect play when controlling for the effects of community characteristics on individual delinquency? These questions are arranged in order from the lowest level (individual) to the highest level (community). A failure to significantly explain variance in the model for any one of these questions prevents advancement to the next level or question.

Do individual strain, negative affect, and delinquency vary within communities? As seen in

Figure 2. Individual-Level Model: Effects of Strain and Negative Affect on Delinquency (Log)—Unstandardized Estimates (N=430).*



* All paths are statistically significant (p<0.05); Standardized Estimates in Parentheses.

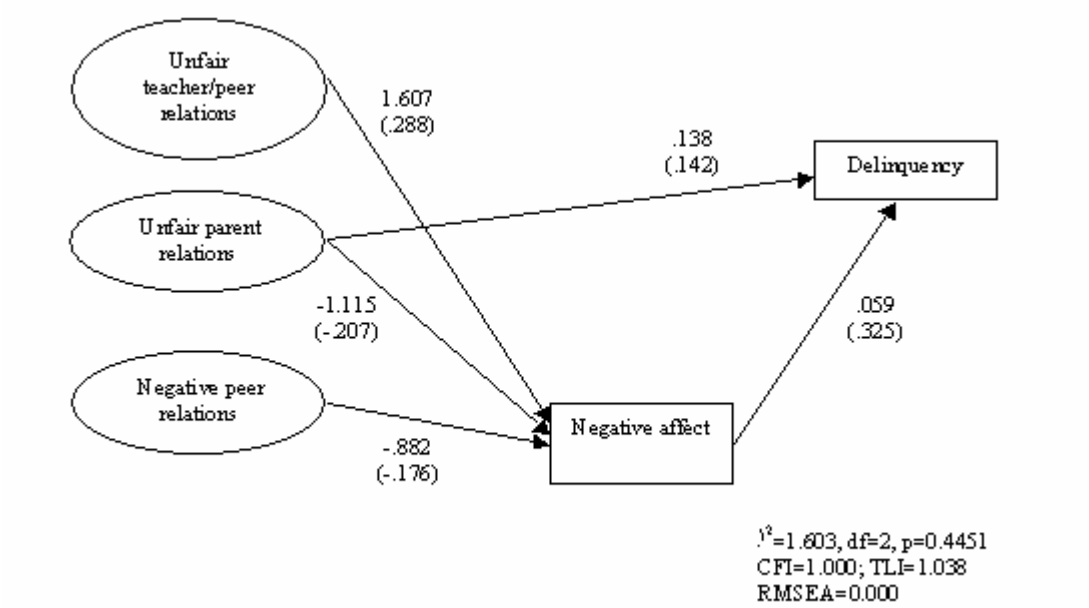
Figure 2, the HLM analysis indicated that individual strain, negative affect, and delinquency do significantly vary within communities (i.e., block groups). As Figure 2 shows, the fit indices indicated a good fit of the model to the data: χ^2 (1, n=430) = 0.31, *p*=0.5781; CFI=1.000; TLI=1.072; and RMSEA=0.000. Among high schoolers, strain as unfair teacher/peer relationships has a significant positive effect on delinquency both directly and indirectly, through negative affect. Strain as negative peer relationships has a significant positive effect on negative affect. However, strain as unfair parent relationships has a significant negative effect on negative affect. Negative affect has a significant direct effect on delinquency. Neither strain as negative neighborhood conditions nor as the removal of positive stimuli has a significant effect on negative affect and delinquency. Consistent with GST (Agnew 1992), the individual-level model suggests that the experience of negative affect, particularly anger, motivates individuals to cope with some forms of strain through illegitimate means.

The individual-level model significantly explained a portion of the variance on delinquency, but would there be enough variance left in the outcome measures to be accounted for by differences between the 108 block group communities? No, the community-level model did not fit the data. The intraclass correlations for delinquency and negative affect were very small: 0.024 and 0.013, respectively. Moreover, the average cluster size (number of within-level cases) for the block groups was also small (3.981). This suggests that the multilevel nature of the data could be ignored for the endogenous variables, and justifies use of supplementary analyses to examine the data contextually (Silver, Mulvey, and Swanson 2002).

SUPPLEMENTARY ANALYSES

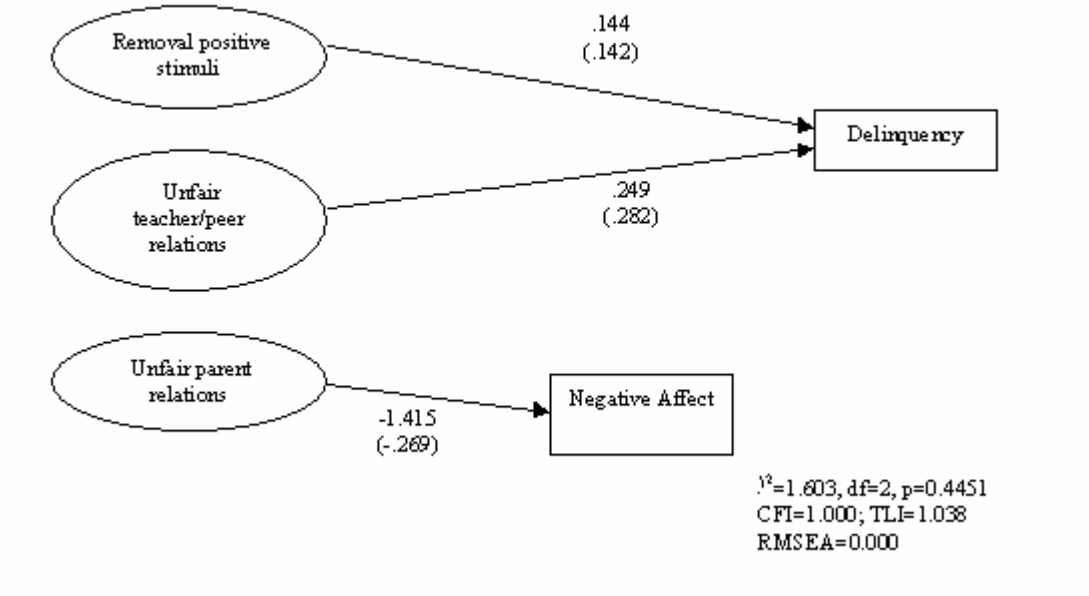
Since it appears that the data were not able to support within-block group analyses using HLM, we decided to perform *ad hoc* contextual analyses examining the strain-anger-delinquency relationships comparing high schoolers living in more disadvantaged communities to those living in less disadvantaged communities. We divided the high school students into two groups based on the factor scores for the six block group characteristics obtained from the 2000 Census data. We used the median (-0.3313) for the community disadvantage factor for the 108 block groups within which the 430 students reported they lived. Students residing in block groups whose community disadvantage factor score fell below the median were characterized as being non-disadvantaged to affluent (n=199); and students residing in block groups whose community disadvantage factor score fell above the median were characterized as disadvantaged (n=231). ANOVA models (not reported here) testing for differences in mean levels of strain, negative affect, and delinquency between those residing in disadvantaged

Figure 3. Effects of Strain and Negative Affect on Delinquency (Log) for Non-Disadvantaged Communities—Unstandardized Estimates (N=199).*



* All paths are statistically significant (p<0.05); Standardized Estimates in Parentheses.

Figure 4. Effects of Strain and Negative Affect on Delinquency (Log) for Disadvantaged Communities—Unstandardized Estimates (N=231).*



* All paths are statistically significant (p<0.05); Standardized Estimates in Parentheses.

communities and those from non-disadvantaged communities revealed only one statistically significant difference; namely, those residing in the more disadvantaged communities reported a lower mean level difference; namely, those residing in the more disadvantaged communities reported a lower mean level of strain as a product of negative neighborhood conditions than that reported by students residing in the non-disadvantaged neighborhoods. Our supplementary analyses now turn to an examination of separate structural equation models for each of these two groups of students.

Figures 3 and 4 illustrate the group (1=non-disadvantaged; 2=disadvantaged) structural equation model of strain, negative affect, and delinquency measures for students heuristically defined as residing in non-disadvantaged and disadvantaged communities respectively. The fit indices indicated a good fit of the model to the data: χ^2 (2, n=430) = 1.60, p=0.4451; CFI=1.000; TLI=1.038; and RMSEA=0.000. As seen in Figure 3, among high school students living in non-disadvantaged areas, strain as unfair teacher/peer relationships has a significant positive effect on negative affect. Strain as negative peer relationships has a significant positive effect on negative affect. However, strain as unfair parent relationships has a significant negative effect on negative affect and a significant positive effect on delinquency. Negative affect has a significant direct, positive effect on delinquency. Neither strain as negative neighborhood conditions nor as the removal of positive stimuli has a significant effect on negative affect or delinquency.

Figure 4 shows the structural equation model of strain, negative affect, and delinquency measures for students heuristically defined as residing in disadvantaged communities. Among high school students living in more disadvantaged areas, strain as unfair teacher/peer relationships has a significant positive effect on delinquency. Strain as the removal of positive stimuli also has a significant positive effect on delinquency. Strain as unfair parent relationships has a significant negative effect on negative affect. However, strain as negative peer relationships and negative neighborhood conditions and negative affect have no significant effects on other variables. While these unstacked structural equation analyses produced two seemingly different models for the strain, negative affect, and delinquency relationships, a comparison of the parameter estimates generated revealed only one statistically different effect; namely a more powerful effect of negative affect on delinquency among those students who reside in the non-disadvantaged communities.

DISCUSSION

The purpose of this study was to test a multilevel strain theory explanation of adolescent delinquency. While general strain theory has been theorized from both a micro-social (Agnew 1992) and macro-social (Agnew 1999) approach and empirically upheld in the former (Agnew and White 1992; Paternoster and Mazerolle 1994; Hoffmann and Su 1997; Brezina 1996, 1998; Mazerolle 1998; Mazerolle and Piquero 1998; Hoffmann and Cerbone 1999; Mazerolle et al. 2000), multilevel tests of general strain theory have been limited. To the best of our knowledge, there have only been three multilevel tests of MST (Brezina et al. 2001; Hoffmann, 2002; Hoffmann and Ireland, 2004), each providing partial support of MST. Since the impetus for examining a multilevel model of strain was derived from Agnew's (1999) arguments that community characteristics should directly affect individual crime, a multilevel model, geared specifically toward a general strain theory explanation of adolescent delinquency and neighborhood influence, was examined.

The main crux of this study focused on investigating the effects of strain and negative affect on delinquency between community block groups. Hierarchical linear modeling (HLM) (Bryk and Raudenbush 1992) was used to test individual (within) and Census block group (between) effects of strain on delinquency and indirect effects of strain on delinquency when mediated by negative affect. Within block groups, the data support findings from previous studies that strain has a significant positive effect on self-reported delinquency and that the reported experience of negative affect, specifically anger, served as a key motivator for such delinquency. However, between block groups, there was no significant difference in the amount of explained variance for delinquency. The HLM analysis suggested that community characteristics do not significantly influence the process by which strain influences delinquent behavior. Therefore, Agnew's contention that community characteristics, when defined by smaller, more homogeneous areas (Agnew 1999: 124), significantly influence strain's effect on delinquency went unfounded with the sample tested.

Since the mere fact that communities were defined as separate block groups did not necessarily mean that these communities differed in the characteristics described by Agnew (1999) as more strain inducing, a supplementary contextual analysis was performed with models examined and compared across similar census block groups. Participants were assigned to one of two groups: those below the median factor score for a community disadvantage variable and those above the median community disadvantage factor score. Structural equation models mimicking the individual level HLM model, predicting both direct and indirect effects of strain on self-reported delinquency through

negative affect, were compared across the two heuristically defined community groups (1=non-disadvantaged, 2=disadvantaged).

The models for non-disadvantaged communities revealed that strain has both a significant positive direct effect on delinquency and a significant positive indirect effect on delinquency, mediated by negative affect. Among these less disadvantaged youths, the factor scores for strain as unfair parent relationships was negatively related to negative affect and positively related to delinquency. Although this contradicts what general strain theory would predict, other studies of general strain theory (Broidy 2001; Hay 2003) have revealed similar negative associations for measures of blocked goals and unfair parental discipline, especially among females. Since our subsample contains significantly more females than the complete high school sample, perhaps this negative association is reflective of gender differences in the strain-anger relationship. Future studies should further explore this aspect. Within more disadvantaged communities, strain does not appear to have an indirect effect on delinquency through negative affect. However, measures of strain as the removal of positive stimuli and unfair teacher/peer relationships was positively related to delinquency among the more disadvantaged youths. Consistent with the lesser disadvantaged group, youths living in more disadvantaged communities were also experiencing strain as unfair parent relationships that had a significant negative effect on negative affect.

Methodologically, this study emphasizes the importance of sample size for HLM analysis and highlights problems associated with multilevel multivariate analyses. One reason the HLM results were not significant between block groups could have been due to the fact that the average sample sizes for the within and between models were relatively small. It is recommended that HLM analyses be conducted with either large samples at the within level (usually greater than 20) and small samples at between level 2 (Muthén and Muthén 2000). The data reflected in this study were relatively small in the within level (average cluster size=3.98). Consequently, the small sample size may have inflated the standard errors in the between level analysis.

There are several theoretical implications of this study. In general, the within model HLM results and supplemental analysis comparing communities support micro-social general strain theory (Agnew 1992). Among adolescents, higher levels of strain explain part of the variation in delinquent behavior. The study also indicated strained individuals are more likely to express high feelings of negative affect and adolescents experiencing higher levels of negative affect, particularly anger, are more likely to be delinquent. Unfortunately, the cross-sectional nature of the analysis prevented the determination of a causal relationship among strain, negative affect, and delinquency. The debate over whether anger serves as a mediator between strain and delinquency (cf. Brezina 1996, 1998), or vice versa (cf. Mazerolle et al. 2000), remains unanswered. Although this study failed to support a multilevel model of general strain theory, such a theoretical advancement of general strain should not be discounted. Instead it suggests that when considering the effects of community differences on strain and ultimately individual delinquency, other theoretical influences must be considered. In fact, Agnew (1999: 147) stated that general strain theory should serve as a supplemental explanation for crime. Future research should attempt to include measures for strain in conjunction with those for theories such as social control, differential association, social disorganization, and subcultural deviance in one multilevel model of crime causation.

The multilevel model in this study presented a number of limitations. These limitations can be divided into two groups, one relating to the data and the other to the model. The most detrimental issue regarding the data used in this study was sample size. Although the study began with a robust sample size of 625 students, measurement errors (e.g., missing data) resulting in incomplete measures led to substantial reduction in the study sample (n=430). The final subset of the sample was comprised of youths who were sparsely distributed spatially over 108 block groups. In addition, the subset varied significantly from the original high school sample along race and gender. This affects the generalizability of our findings to other populations, and may have influenced the association between strain as unfair parent relationships and negative affect. Moreover, the models tested did not contain alternative measures of negative affect (e.g., anxiety, depression, guilt, etc.), only trait anger, or other conditioning variables. Future studies should attempt to incorporate more specific measures of strain, measures for supplemental explanations of delinquent motivation, and control measures.

CONCLUSION

Recently Agnew (1999) proposed an expanded version of general strain theory that provides macro-social implication for explaining variation in crime rates across differing communities. Agnew's macro-strain theory (MST) was presented as a supplement to other macro-level theories of crime; one that more completely addresses motivational aspects. According to MST, variation in crime rates depends on the levels of aggregate strain, aggregate negative affect/anger, and other stressful community conditions. Communities characterized as highly disadvantaged create strain and anger by blocking members' abilities to achieve positive goals, creating a loss of positive stimuli, exposing

members to negative stimuli, and increasing overall relative deprivation. Moreover, disadvantaged communities are also more likely to both select and retain strained individuals and to produce interactions involving angry participants.

To date we have been able to identify only one macro-level test MST (Warner and Fowler 2003) and three multi-level tests (Brezina et al. 2001; Hoffmann 2002; and Hoffmann and Ireland 2004). The results of these studies are quite mixed. The purpose of the present study was to add to this emergent research literature by providing an additional multi-level test. With self-report survey data from 430 high school students we attempted to answer three questions: (1) Does community context have any direct effects on individual levels of strain, negative affect, and/or delinquency? (2) Does community context have any indirect effects on delinquency through its effect on strain and/or negative affect? (3) Does community context condition the effects of strain and/or negative affect on delinquency? Our initial analyses, based on hierarchical linear modeling (HLM), suggest that the answer to each of these questions is in the negative. However, the level-2 data were comprised of 108 block group communities for our 430 students, with an average of only 4 students per block group community. Such a value is considered to be too small for HLM (Muthén and Muthén 2000). Such small sample size tends to inflate the standard errors in the between level analysis in HLM. Conversely, our supplementary analyses of separate individual-level structural equation models for students residing in disadvantaged and non-disadvantaged communities respectively did produce evidence for the appearance of the conditioning effects of community disadvantage on the relationships between strain, negative affect and delinquency. More specifically, these data suggest different strain-negative affect-delinquency models across levels of community disadvantage. However, a comparison of the parameter estimates generated from these structural equation models produced only one significantly different path, suggesting quite strongly that Agnew's general strain theory may be invariant across community types. Clearly additional multi-level tests of general strain theory are in order.

ENDNOTES

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