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There is a lack of macro-level gang research. The present study addresses this shortcoming by providing a theoretically informed analysis of gang membership in large US cities. More specifically, our goal is to determine whether racial and ethnic heterogeneity conditions the relationship between economic disadvantage and gang membership. Three separate sources of data are used in this study: U.S. Census 2000, Law Enforcement Management and Administrative Services 2000, and National Youth Gang Survey 2002-2006. A series of weighted least-squares regression models are estimated, finding that both economic disadvantage and racial and ethnic heterogeneity exhibit independent and additive effects on gang membership. In addition, the results show that racial

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and ethnic heterogeneity has a conditioning relationship with economic disadvantage. Furthermore, our expanded operationalization of the Blau heterogeneity measure indicates that prior research may have underestimated the effects of heterogeneity. The authors discuss these findings in the context of existing gang research and offer directions for future research.

**Keywords**  gang membership; gang formation; racial and ethnic heterogeneity; Blau; economic disadvantage

### Introduction

Economic disadvantage is closely tied with crime and other social problems (Blau & Blau, 1982; Pratt & Cullen, 2005; Shaw & McKay, 1942). Pratt and Cullen’s (2005) meta-analysis of predictors of aggregate crime rates found economic disadvantage to be one of the strongest and most consistent macro-level predictors of crime. A number of works have found that unsupervised peer groups (i.e., gangs) are often concentrated in disadvantaged neighborhoods characterized by economic deprivation, high residential mobility, and racial and ethnic heterogeneity (Bursik & Grasmick, 1993; Hagedorn, 1991; Hughes & Short, 2005; Shaw & McKay, 1942; Short & Strodtbeck, 1965; Thrasher, 1927).

Rates of gang membership, however, are not uniform across disadvantaged communities. In other words, some disadvantaged areas produce gangs while others do not (see, e.g., Katz & Schnebly, in press). Our knowledge of this relationship, though, is constrained for two reasons. First, most accounts of gangs and economic disadvantage are limited because they examine only one city or a limited geographical area in the USA (e.g., Southern California or Chicago). Analyses of one gang or one neighborhood result in an “N” of only one, making the comparative effect of social and economic conditions on gang membership difficult to assess. In this context, Klein (2005) stressed the need for comparative gang research across locations (e.g., neighborhoods within cities, between-cities, and between-countries). While two studies have employed macro-level methodologies (Jackson, 1991; Wells & Weisheit, 2001), this research is limited in that it concentrated solely on whether cities had a gang problem rather than assessing the prevalence of gang membership. Given the presence of gangs in most large cities in America (Egley, Howell, & Major, 2004), this essentially limits the variation of the dependent variable. A more comprehensive macro-level study of gang membership is warranted given the history of macro-level theory (e.g., anomie/strain, social disorganization) in gang research and its impact on how later theory, research, and policy has formed (Kornhauser, 1978; Spergel, 1995).

Second, traditional theoretical explanations for gang formation have focused on strain/anomie and limited opportunity structures as causes of gang formation (Cloward & Ohlin, 1960; Cohen, 1955; Miller, 1958) while largely ignoring issues of race and ethnicity. This exclusion is potentially problematic given that some
research has shown that race and ethnicity play an important role in gang formation and gang membership (Alonso, 2004; Davis, 2006; Freng & Esbensen, 2007; Thrasher, 1927; Vigil, 1988, 2002). In particular, Alonso (2004, p. 662) noted that "[t]his apparent omission [of race and ethnicity] leads to some major shortcomings in both contemporary and traditional gang formation theory." Racial and ethnic heterogeneity, hereafter referred to as heterogeneity, has proven to be an important factor within community contexts (Sampson & Groves, 1989; Shaw & McKay, 1942; Suttles, 1968), but has rarely been applied to the gang context. The studies that have employed macro-level methodologies that could have empirically assessed this relationship included one race or ethnicity as an independent variable (e.g., percent Black, Hispanic) rather than examining the composition of ethnic groups across cities.

The present study addresses these limitations by providing a theoretically informed examination of gang membership across cities. Our goal is to determine whether heterogeneity conditions the relationship between economic disadvantage and the presence of gang members at the city-level. Evidence in favor of the moderating capacity that heterogeneity has on gang membership would legitimize existing qualitative accounts of racial and ethnic conflict as an explanatory variable. This research will aid in understanding why some cities have higher levels of gang activity and will bring value to our existing knowledge of criminological theory and its ability to explain problems at a macro-level.

**Economic Disadvantage and Gangs**

Economic disadvantage is an anchor to many macro-level theories of crime. Pratt and Cullen's (2005, p. 412) meta-analysis of macro-level research concluded that the criminogenic importance of economic disadvantage "appears to be well supported across all macro-level studies of crime." Research that examines structural disadvantage concludes that as the level of affluence or socio-economic status increases, crime rates and other social problems decrease. While this argument is fundamental to a number of theories, the mechanisms through which economic disadvantage serves to increase crime are not always agreed upon.

Two major macro-level theories, social disorganization and anomie/strain, both rely heavily on economic disadvantage as a key predictor of social problems. The social disorganization perspective holds that economic disadvantage matters insofar as it increases residential mobility and heterogeneity—both key correlates of crime in transitional areas of a city (Burgess, 1928; Shaw & McKay, 1942). Sampson’s reconstruction of social disorganization theory contends that these social factors—economic disadvantage, residential instability, and racial heterogeneity—inhibit a community’s ability to impose social control (Sampson & Groves, 1989; Sampson, Raudenbush, & Earls, 1997; see also Bursik & Grasmick, 1993), resulting in higher neighborhood crime rates.
On the other hand, a strain/anomie perspective conceptualizes the function of economic disadvantage differently. This perspective posits that crime is a product of the discrepancy between the emphasis on economic success and access to legitimate means to attain such success (Merton, 1938; Messner & Rosenfeld, 2007). This strain is seen most clearly in a limited or blocked opportunity structure for acceptable means to success. Those in economically deprived areas experience more strains than those with high economic status. Crime occurs as people find other means to be successful, or give up altogether on the goal of traditionally defined success (Chamlin & Cochran, 1995; Merton, 1938; Messner & Rosenfeld, 2007).

Economic disadvantage plays a major role in macro-level explanations of crime and a considerable amount of research has documented several correlates of economic disadvantage, including the presence of gangs (Anderson, 1999; Wilson, 1987). Gang theory, akin to macro-level crime theory, has long emphasized economic disadvantage as a chief underlying construct of both social disorganization and strain/anomie perspectives (Cloward & Ohlin, 1960; Cohen, 1955; Miller, 1958; Thrasher, 1927; Whyte, 1943). Again similar to a macro-level crime context, the mechanisms by which economic disadvantage fosters gang formation are operationalized differently by each respective theory. A social disorganization perspective would argue that poverty creates a breakdown of informal social controls resulting in a social reorganization, of which gangs are a product. While a strain/anomie perspective would contend that gangs form in response to a blocked opportunity structure thus resulting in a realignment of what constitutes success and legitimate means to obtain that success.

No matter which theory one subscribes to, it is difficult to dispute that gangs (and their members) are more inclined to form in interstitial, or more economically disadvantaged, areas (Bowker & Klein, 1983; Bursik & Grasmick, 1993; Curry & Spergel, 1992; Shaw & McKay, 1942; Short & Strodtbeck, 1965; Thrasher, 1927). City-specific accounts show this to be the case (see Decker & Van Winkle, 1996; Hagedorn, 1988; Sanchez-Jankowski, 1991; Short & Strodtbeck, 1965; Venkatesh, 1997; Vigil, 1988). Two macro-level studies also found bivariate associations, although modest, between disadvantage measures and the presence of gangs (Jackson, 1991; Wells & Weisheit, 2001).

One point of dispute, though, is the breadth of the impact of disadvantaged areas in producing gangs and gang members. In others words, not all areas of comparable disadvantage produce equal shares of gangs and gang members. A recent study in Mesa, Arizona (Katz & Schnebly, in press), illustrated this fact. Consistent with a disadvantage-based theoretical perspective, the authors found that economic deprivation and social/familial disadvantage predicted increases in gang members per capita within Mesa’s 93 census tracts. Most importantly, their analysis revealed that while gang members tended to live in more

1. For example, early childhood development (Duncan, Brooks-Gunn, & Klebanov, 1994), homicide (Parker & McCall, 1999), and schooling (Duncan, 1994).
2. By this we mean theoretical explanations for the formation of gangs.
disadvantaged census tracts, a number of the most disadvantaged and economically deprived census tracts did not have concentrations of gang members greater than other areas of the city. This leads us to believe that disadvantage alone may not fully explain gangs and gang membership, suggesting that additional covariates may moderate (or potentially mediate) this relationship.

Relatively recent theoretical developments (Klein, 1995; Vigil, 2002) show that gang formation is contingent upon multiple factors that simultaneously converge. Both Vigil and Klein posited that gangs typically form in communities where an accumulation of different forms of disadvantage (e.g., economic disadvantage, lack of opportunities, family disruption, racial discrimination) come together. Both the emergence and sustainability of gangs and gang membership rely on the extent to which these disadvantages are more pervasive in communities. While nearly all cities across America with populations greater than 100,000 experience some type of gang presence (Egley et al., 2004), cities experiencing increased disadvantage should encounter a larger presence of gang members.

The research above reveals two key issues confounding our existing knowledge about the structural correlates of gangs and gang membership. First, because different studies examine different units of analysis (e.g., within-city vs. across cities), it is difficult to understand whether a significant correlate is limited to one or multiple communities (Short, 1998; see also Esbensen & Winfree, 1998, p. 506). Moreover, our knowledge is also constrained by the truncation of the dependent variable, treating the gang-related outcome dichotomously (no-gang/gang city) or trichotomously (no-gang/stable gang/chronic gang city). This severely limits the variation of the dependent variable, particularly in a study that examines large cities, where every jurisdiction reports the presence of gangs.

Second, scholars have pointed out the multidimensionality of gang problems (Klein, 1995; Spergel, 1995; Vigil, 1988), meaning that one component (e.g., disadvantage) is inadequate for fully explaining the variation in the concentration of gang problems. The role of race and ethnicity has yet to be fully integrated into this equation even though the class Chicago School literature would suggest doing so. In Alonso’s (2004, p. 662) socio-historical analysis of Black gang formation in Los Angeles, he noted that "what is most striking about the corpus of gang formation research is the limited discussion of how race and structure have worked together to create communities that have produced gangs.” To the extent that this is true, gang formation theory needs to explore the degree to which race/ethnicity impacts the formation of gangs and gang membership in urban communities.

Racial and Ethnic Heterogeneity and Gangs

Across time, population groups in the USA have tended to coalesce around race/ethnicity (Ihlanfeldt & Scafidi, 2002; Moody, 2001; Omi & Winant, 1994). With some exceptions (see Howell, Moore, & Egley, 2002; Starbuck, Howell, &
Lindquist, 2001), this has also been found to be true among gangs (Esbensen & Winfree, 1998; Klein, 1995; Knox, 2000; Sanchez-Jankowski, 1991; Thrasher, 1927; Vigil, 2002). This has been the case for over eight decades, as Thrasher (1927) found that race, ethnicity, and nationality were important factors for gangs in that neighborhood adolescents aligned with youth of similar backgrounds. The existing problem, however, as Klein and Maxson (2006, p. 221) stated, is that “[e]thnicity is one of the most widely discussed, and little studied, aspects of gangs.”

An emphasis on racial and ethnic patterns was evident in Chicago School research (e.g., Burgess, 1925; Shaw & McKay, 1942; Thrasher, 1927). This research highlighted the “transition zone” as an area of social disorganization, subject to relentless disruption, crime, and racial and ethnic turnover. Thrasher (1927) detailed this turnover and discussed the succession of one ethnic group to another in certain neighborhoods. This led to the unification around ethnic groupings in response to the ever changing “racial complexion” of neighborhoods, which is consistent with more recent research documenting the importance of gang joining and gang formation for protective purposes (Decker & Curry, 2000; Esbensen & Lyskey, 2001; Maxson & Whitlock, 2002; Melde, Taylor, & Esbensen, 2009; Thornberry, Krohn, Lizotte, Smith, & Tobin, 2003). Thrasher (1927, p. 133) noted how inter-ethnic European rivalries persisted (e.g., Jewish v. Polish) as “old world antagonisms are carried over into gang wars.” It appears from Thrasher’s research that race, ethnicity, and nationality played a significant role in gang formation:

> [t]he gang then, to sum up, is one manifestation of the disorganization incident to cultural conflict among diverse nations and races gathered together in one place and themselves in contact with a civilization foreign and largely inimical to them. (1927, p. 154)

This argument has been put forth more recently to explain the gang landscape in Europe, where changing structural conditions (e.g., immigration) are interacting with more street-level conditions and resulting in the formation of gangs (Decker, Van Gemert, & Pyrooz, 2009).

While the Chicago School provided much detail on the development and culture of gangs in Chicago, the other “traditional” gang city—Los Angeles—did not have a university devoted to studying the ecology of gangs in its urban regions. Nevertheless, Alonso (2004), Davis (2006), Moore (1985), and Vigil (2002) have documented the development of gangs in Los Angeles using a variety of sources (e.g., mainstream and ethnic newspapers, ethnography, and interviews). Their research underscores a common theme: social exclusion, White privilege, marginalization, and racial conflict as the catalysts behind gang formation in Los Angeles. In Adamson’s (2000) historical analysis of Black and White gangs since the late 1700s, a similar theme emerged. He held that gangs

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3. For example, Thrasher discussed the Bridgeport community and how the original Irish population gave way to the Germans, who then later gave way to the Polish.
served “defensive localism” purposes, in that youth came together when faced with cultural change (see also Decker et al., 2009; Page & Marcelin, 2003). Much of the differences between youth gangs, especially Black and White gangs, were a result of structural factors—a thesis that has yet to be explored in a quantitative context.

Vigil (2002) documented marked differences in cultural change that resulted in the formation of gangs among four different racial/ethnic groups in Los Angeles: Mexicans, Blacks, Vietnamese, and Salvadorans. Vigil found that these groups were culturally distinct from one another, yet shared similar routes in their establishment of youth gangs. These four groups experienced what Vigil called “multiple marginality,” where breakdowns of social and economic factors led to a “street socialization” takeover. In Vigil’s words, across these groups:

[w]hat is remarkable is the similarities that underscore how multiple marginality acts and reacts within populations to drive children into the streets and how immigration or migration adaption is a central part of this process ... [a]s children undergo street socialization they form a street subculture, namely, a gang. (2002, pp. 16-17)

In an examination of Vigil’s marginality framework, Freng and Esbensen (2007) used peer deviance as a proxy for street socialization and found it to be a significant correlate of Black and Hispanic (but not White) gang membership.

Research that explores gangs and gang membership theoretically tends to treat race and ethnicity in terms of discrimination (Klein, 1995; Spergel, 1995; Vigil, 1988). Many of those who have addressed race and ethnicity empirically have done so in terms of “one-group” prevalence (e.g., percent Black or Hispanic; Jackson, 1991; Katz & Schnebly, in press; Rosenfeld, Bray, & Egley, 1999; Tita, Cohen, & Engberg, 2005; Wells & Weisheit, 2001). To the extent that protection and respect are garnered in economically deprived areas by neighborhood youth aligning along ethnic lines in response to conflict, or the threat of conflict (Adamson, 2000; Decker, 1996; Vigil, 1988), it may be the case that previous accounts of gang formation theory need to integrate race and ethnicity as a conditioning factor between economic disadvantage and gangs. If this is the case, the failure to account for heterogeneity may misrepresent some of the causes and sustainers of gang formation and gang membership. But at this point in time, given the scarcity of macro-level gang research, it is necessary to take a step toward identifying relevant predictors that apply to cities, not just a city.

Current Focus

The present study explores the relationship between racial and ethnic heterogeneity, economic disadvantage, and gang membership. To date, there have been four quantitative accounts that have looked at (1) whether a city has a gang problem (Egley, 2005; Jackson, 1991), (2) differences in types of gang problems between metropolitan and nonmetropolitan areas (Wells & Weisheit,
2001), and (3) variations of gang member concentrations within neighborhoods (Katz & Schnebly, in press). The remainder of the research is typically focused more qualitatively on a single jurisdiction. Klein (2005, p. 135) argued that gang research suffers from a lack of cumulative knowledge, and summoned scholars to conduct their gang research “by coordinated rather than disparate methods.” The problem is that the evidence in support of race and ethnicity (and even economic disadvantage) has been limited to observations that are not capable of generalization beyond the scope of the area of study. As Maxson (2001) pointed out, a comprehensive macro-level approach is necessary to understand how larger, social-structural patterns are related to the size of community gang problems. This will advance the state of the gang literature from a localized to a generalized starting point for others to test other theoretical contentions. Our goal here is not theory testing per se; rather, it is to provide a theoretically informed examination of the potential conditioning relationship between heterogeneity and economic disadvantage across large cities in the USA.

Methods

Data

Three sources of data are used in this study: U.S. Census Bureau, Law Enforcement Management and Administrative Services (LEMAS; U.S. Department of Justice, 2000), and the National Youth Gang Survey (NYGS). Across the unit of analysis—the 100 most populated US cities—we used the above sources of data for our outcome and explanatory variables. All of our explanatory variables were extracted from the 2000 U.S Census and the 2000 LEMAS data. The U.S. Census data were specific to city demographic variables, while the LEMAS data were used to control for law enforcement-related characteristics within a city. The Office of Juvenile Justice and Delinquency Prevention (OJJDP) recognized the lack of systematically collected statistics on the extent of national gang problems and established the Nation Youth Gang Center in 1994 (Curry & Decker, 1998). This annual survey administered by the National Youth Gang Center (NYGC) is the only systematically collected source of gang and gang member data available (Klein & Maxson, 2006, p. 212). We used the data collected between 2002 and 2006 for the construction of our dependent variable. Missing data were addressed using PRELIS version 2.30 (Lisrel 8.72; Jöreskog and Sörbom, 1996). Better known as “hot-decking,” this procedure uses donor cases with similar response patterns to impute missing values. This method of imputation has been touted as a superior alternative to mean replacement and listwise deletion (Gmel, 2001; Little, Yosef, Cain, Nan, & Harlow, 2008).
Dependent Variable

The NYGC collects data annually from law enforcement agencies on the extent to which gang problems exist in cities across the nation (NYGC, 2007). These data have been used frequently in government publications (e.g., National Youth Gang Center, 2007) and in peer-reviewed outlets (e.g., Katz, Maguire, & Roncek, 2002; Wells & Weisheit, 2001). The survey contains information specific to a city’s onset of gang problems, number of gang homicides, demographics of gang members, the number of gangs, and the outcome variable of interest in the present study—the number of gang members.

Law enforcement gang intelligence has been found to be a useful estimate of city gang activity (Katz, Webb, & Schaefer, 2000). Some have questioned law enforcement gang information systems on the basis that they are unable to distinguish between gang and nongang individuals as well as differences in offenses (McCorkle & Miethe, 1998; Zatz, 1987). Katz et al. (2000), however, found that gang intelligence exhibited strong discriminant validity for both gang/nongang youth and offenses. Katz et al. (2000, p. 434) concluded that “as a measurement tool, gang documentation and the use of data from gang lists goes beyond mere face validity and reflects the underlying properties and behaviors associated with gang participation.” Moreover, Katz, Ballance, and Britt (2005), in an examination of NYGC data and Arizona Youth Gang Survey data, found data on gang members to be stable and reliable, especially from law enforcement agencies serving larger populations.4

To further assess the internal reliability and validity of our dependent variable, we conducted a series of analyses. First, employing a test/re-test method, we examined the between-year zero-order correlations of gang membership in the cities in our sample. The mean inter-item correlation across years was .92, suggesting extremely high reliability. Similarly, to explore the convergent validity of the measure, we examined the zero-order correlations between the dependent variable and other NYGC measures (number of gangs; number of gang homicides) that would be expected to increase as the number of gang members increases. This analysis revealed that our dependent variable was moderately correlated (mean inter-item \(r = .47\)) with the number of gangs and highly correlated with number of gang homicides (mean inter-item \(r = .85\)). The moderate correlation of the former is not surprising given that gangs operate within different structures resulting in larger or smaller numbers of members (Klein & Maxson, 2006, pp. 172-193). Given Katz and colleagues’ assessment of the external reliability (Katz et al., 2005) and validity (Katz et al., 2000) of the police data and our examination

4. It would be difficult for any study to undertake a macro-level study of gangs/gang membership without the extensive assistance of law enforcement. The police consistently interact with gangs and gang members, having the ability to observe, document, and address emerging gang trends on the street (Decker, 2003; Katz & Webb, 2006). Some empirical research has taken on the task of collecting nation-level gang information (e.g., Maxson & Klein, 1995; Miller, 1982; Needle & Stapleton, 1983), but not systemically over time. In addition, the NYGC has been in operation since 1994 and has had the opportunity to refine and bridge some of the gaps between law enforcement and academia.
of the internal reliability of the police data, the use of our dependent variable is appropriate, as it has passed important measurement tests.

We examined the NYGS data for the 100 largest cities in the USA. Our objective was to construct a measure that most accurately depicted the number of gang members documented by law enforcement officials in their city. This was done by creating a multi-year average as our dependent variable, with yearly survey points between 2002 and 2006 to establish temporal order with our independent variables, using the mean as our measure of central tendency. This method limits any internal inconsistencies and the potential for large fluctuations within a city. The natural log was taken to approximate a normal distribution. A list of the 100 cities included in the analyses can be found in Appendix A. (See Table 1 for the mean, standard deviation, minimum, and maximum values for all the variables included in the analysis.)

Independent Variables

Heterogeneity

The measure of racial and ethnic heterogeneity traditionally used in macro-level research was developed by Blau (1977). This measure varies from 0 to 1 and is calculated by taking one minus the squared proportions of the population in each racial and ethnic group. Traditionally, studies using Blau’s operationalization of racial and ethnic heterogeneity consist of five or six major racial/ethnic groups—whites, blacks, Hispanics, Asians, and others. For example, Salvadorans would be lumped in the Hispanic category. As Vigil’s (2002) and Maxson’s (2009) research underscored, Salvadoran gangs in Los Angeles (e.g., MS-13) grew in the 1980s, partly in response to the threat from other racial and ethnic groups. Further, there are substantive differences between many Hispanic groups (e.g., Mexicans, Cubans, Salvadorans, etc.). Esbensen, Brick, Melde, Tusinski, and Taylor (2008) recommended that future research be more attentive to gang and gang membership ethnic differences. With this in mind, for the present study, we expanded the

5. The NYGC typically sends the questionnaire to the same respondent each year and maintains roughly a 90% response rate. The NYGC asks a law enforcement representative to report information about "a group of youths or young adults in your jurisdiction that you or other responsible persons in your agency or community are willing to identify as a 'gang.' Motorcycle gangs, hate or ideology groups, prison gangs, and exclusively adult gangs were excluded" (NYGC, 2007).

6. For instance, if City A is 88% White and 12% Hispanic, this city would receive a heterogeneity score of .2112, indicating a high level of homogeneity. On the other hand, if City B comprises a population that is 88% White, 4% Cuban, 4% Mexican, and 4% Salvadoran, the city would have a heterogeneity score of .2208. While this difference between City A and City B is small, it is a difference that would be masked by combining all Hispanics (or other ethnic groups) into one homogenous category.
traditional Blau measure to account for smaller ethnic groupings, capturing more unique differences between cities to operationalize heterogeneity.7

Economic disadvantage

Similar to past research, our measure of economic disadvantage consisted of five items derived from the 2000 U.S. Census (McNulty & Bellair, 2003; Parker & Reckdenwald, 2008; Peterson, Krivo, & Harris, 2000). The variables included were: (1) percentage of female-headed single parent families with children under 18, (2) percentage of population receiving public assistance, (3) percentage of population with less than high school education, (4) median household income in 1999, and (5) percentage of population in civilian labor force unemployed. Using principal axis factoring, these items loaded on one factor with an eigenvalue of 3.06, which explained 61.22% of the variance in the measures. The lowest factor loading was .65 (percent with less than high school education). The psychometric properties of the scale exhibited strong internal consistency (Cronbach’s alpha = .78; mean inter-item correlation = .60). The five items were then condensed into a factor score for analytic purposes.

Control Variables

To ensure that any observed relationships between our dependent variable and key independent variables are not spurious, we control for four city-level, structural characteristics. First, we controlled for two city demographic factors, youth male population and population density. Gang research has consistently found that males are more likely to join gangs than females (Klein & Maxson, 2006). Because of this, we control for the percent of the youth male population between 12 and 24 years old, a standard age interval for gang involvement. Further, prior macro-level gang research, in addition to other macro-level criminological research, has also consistently controlled for population density (Baller, Anselin, Messner, Deane, & Hawkins, 2001; Jackson, 1991; Pratt & Godsey, 2003; Wells & Weisheit, 2001). Second, we control for two indicators of law enforcement composition and practice, whether the city had a gang unit and police representativeness. These are important factors to consider when examining city-level gang membership, especially since the NYGS based on law enforcement data. By controlling for whether the city has a gang unit we take into account any potential bias associated with the reporting techniques due to

7. The following racial and ethnic groups were considered for our analyses: Alaskan Natives, American Indian, Argentinian, Asian Indian, Bangladeshi, non-Hispanic Blacks, Bolivians, Cambodians, Chileans, Chinese, Columbians, Costa Ricans, Cubans, Dominicans, Ecuadorians, Filipinos, Guatemalans, Hmong, Honduran, Indonesian, Japanese, Koreans, Laotians, Malaysians, Mexicans, Micronesians, Multiple Races, Nicaraguans, other Pacific Islander, Pakistani, Panamanian, Paraguayan, Peruvian, Polynesians, Puerto Ricans, Salvadorans, Spaniards, Sri Lankans, Thai, Uruguays, Venezuelans, Vietnamese, non-Hispanic Whites.
the presence (or lack) of the unit (Katz & Webb, 2006; Katz et al., 2000). In a similar vein, we control for the racial representativeness of the city’s police force, based on the assumption that opposite-race officers might profile youth (Raganella & White, 2004; Walker & Katz, 2007). We do this by dividing the percentage of the White police force by the percentage of the city’s White population, with scores distributed close to 1 indicating a racial representativeness while scores greater than 1 point to an over-representativeness of Whites.

Analytic Strategy

We estimate a series of weighted least-squares (WLS) regression models to determine the relationship between city-level structural characteristics and gang membership. Consistent with other macro-level studies (see Pratt & Godsey, 2003; Reisig, Bales, Hay, & Wang, 2007), WLS regression helps correct for the problems associated with heteroscedasticity that plagues ordinary least-squares regression (Tabachnick & Fidell, 2007). Each case was weighted by population in order to induce homoscedasticity among the error variances.

Our strategy for determining whether heterogeneity conditions the relationship between economic disadvantage and gang membership is presented across four models. In our first model, we regress our dependent variable—gang members—on economic disadvantage and our control variables to establish whether an accepted contention within the gang literature (disadvantage increases the likelihood of gangs/gang membership) is indeed present in a macro-level, multivariate context (Bowker & Klein, 1983; Curry & Spergel, 1992; Short & Strodtbeck, 1965). The second model tests, with disadvantage excluded, whether there is a relationship between heterogeneity and gang membership across cities. This model will confirm qualitative accounts that ethnicity has been an overlooked covariate of gang membership (Alonso, 2004; Davis, 2006; Moore, 1985; Thrasher, 1927; Vigil, 1988, 2002). In our third model, we include both measures—economic disadvantage and heterogeneity—to examine the independent effects net of each other (i.e., additive model). The final model includes an interaction term between our key measures to determine whether heterogeneity conditions the relationship between economic disadvantage and gang membership. Our strategy will allow us to assess the independent, additive, and multiplicative effects of our measures, as well as providing the first examination of structural covariates of gang membership at a macro-level of analysis.

Results

Table 1 displays the descriptive statistics and zero-order correlations for the study variables. The cities included in this analysis ranged considerably in population density from 153.40 to 26,403.90 persons per square mile. This item is
expressed in scientific notation in Tables 1 and 2 for purposes of interpretation. The proportion of youth male residents ranged from nearly 7% to 15% in cities included in the sample (mean = 9.75%). Most of the urban police departments employed a full-time specialized gang unit (mean = .77%) and the police representativeness measure indicated that officers (e.g., White officers), on average, make up about 49% more of the police force than they do the population in these cities. Our two key independent variables, economic disadvantage and heterogeneity, revealed considerable variation across the sample, which can be seen in Table 1. Before presenting the multivariate findings, it is first necessary to diagnose whether our models are subject to any issues related to multicollinearity.

Bivariate Correlations and Assessing Multicollinearity

Zero-order correlation coefficients are presented in Table 1. The coefficients in the first column reveal the bivariate relationships between the independent variables and gang membership. Gang unit, population density, and police representativeness positively varied with the dependent variable while youth population did not. Our two key explanatory variables, economic disadvantage and heterogeneity, had positive associations with our outcome variable, meaning more disadvantage and greater heterogeneity increase with gang members. While these bivariate relationships reveal important information about our study variables, the associations are independent of other influential variables. In other words, it is necessary to explore the effects in a multivariate context. Before doing so, it is necessary to determine whether multicollinearity is present within our data.
The problems of multicollinearity can occur when two highly correlated independent variables are both included in a model which may introduce bias that results in unstable parameter estimates (Farrar & Glauber, 1967; Tabachnick & Fidell, 2007). As a preliminary precaution, the inter-correlations between independent variables were examined to see if any associations exceeded the .70 threshold deemed as problematic (Fisher & Mason, 1981). This was not the case, however, problems may still be present when bivariate correlates are large. For example, population density and police representativeness have a fairly large bivariate correlation ($r = .46$), which could potentially be an issue if we based our diagnostics solely on inter-correlations (Tabachnik & Fidell, 2007). To determine whether this was indeed the case, we examined the squared multiple correlations (SMC) for each predictor. Variance inflation factors (VIFs) revealed scores no greater than 3, and conditioning index numbers fell within the standard specified by Belsley, Kuh, and Welsch (2004). Based on our examination of the various collinearity diagnostics (bivariate correlations, tolerance, VIF, and condition index), we are confident in proceeding to the multivariate models.

**Multivariate Models**

Table 2 displays the results from our WLS regression models examining the impact of heterogeneity and economic disadvantage on the number of gang members across cities.

In Model 1, the purpose is to first establish whether economic disadvantage is predictive of city-level aggregate gang membership net of controls. The model is robust, explaining 28% of the variation in the dependent variable. In this model, the two control variables that are significantly related to gang membership are specialized gang unit ($\beta = .289$, $p < .01$) and population density ($\beta = .254$, $p < .05$). The insignificance of the police representativeness measure indicates that the bivariate effect was washed out in the multivariate context. Our key measure, economic disadvantage, did in fact have a positive direct effect on the number of gang members across large cities in the USA. The relationship was moderate ($\beta = .250$, $p < .05$), but the effect size was less than both specialized gang unit and population density. From a controls-only model

---

8. We looked at the variation explained in one variable by treating it as an outcome of the remaining independent variables. Typically, statistical packages (e.g., SPSS) convert the SMC to a tolerance statistic—(1-SMC)—or to a VIF—(1/tolerance)—in reporting whether multicollinearity is present. VIF scores greater than 4 (i.e., tolerance scores less than .25) are seen as the threshold indicative of multicollinearity (Fox, 1991). Maddala (1992) pointed out the limitations in basing collinearity diagnostics solely on VIF scores, which is why we examined the conditioning index.

9. As an added measure of precaution, we also considered the number of officers per 1,000 citizens across cities. The effect was not significant in the bivariate (and thus multivariate) model. Including the item in the multivariate models did not improve model fit, nor did it alter the sign and significance of the other explanatory variables. Moreover, as it is common in macro-level research because of small sample size, we needed to consider the potential for oversaturating the model (Long, 1997). As a result, we retained gang unit and police representativeness as opposed to officers per capita due to the obvious contribution the former two variables made in the bivariate models.
(model not reported), the coefficient of multiple determination increased by nearly 20\% (\(R^2_\Delta = .05, p < .01\)). More importantly, this finding empirically confirms the existing literature that economic disadvantage is in fact a significant structural correlate of gang membership at the city-level unit of analysis.

Model 2 examines whether heterogeneity should be considered as a factor in explaining gang membership. Similar to Model 1, this model is fairly robust and explains 44\% of the variation in the dependent variable. Heterogeneity does in fact substantially improve the amount of variation explained in comparison to a controls-only model (\(R^2_\Delta = .21, p < .01\)). Heterogeneity exhibited a strong direct effect (\(\beta = .566, p < .01\)) on gang membership. Population density no longer had an effect in this model, suggesting that heterogeneity reduced the relationship to nonsignificance. As a result, both Models 1 and 2 are consistent with our hypotheses that economic disadvantage and heterogeneity do indeed have direct effects on gang membership.

To examine whether the findings from Models 1 and 2 are truly "robust," Model 3 includes both key independent variables to determine whether their effects on gang membership hold when both measures are in the model. With both predictors in the model, the variation explained increases from that of the first two models (\(R^2_\Delta = .49; p < .01\)). This model reveals that both economic disadvantage (\(\beta = .253, p < .01\)) and heterogeneity (\(\beta = .568, p < .01\)) maintain their significance and effect size from the independent models. This tells us that both variables are significant predictors of gang membership at the city-level net of each other.

Table 2  WLS regression models predicting gang members (ln) at the city-level (N = 100)

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction: Disadvantage-heterogeneity</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>2.357 (0.927)</td>
</tr>
<tr>
<td>Heterogeneity(^1)</td>
<td>–</td>
<td>6.576 (1.114)</td>
<td>6.598 (1.070)</td>
<td>6.325 (1.046)</td>
</tr>
<tr>
<td>Economic disadvantage</td>
<td>0.447 (0.180)</td>
<td>0.250*</td>
<td>0.453 (0.152)</td>
<td>0.439 (0.148)</td>
</tr>
<tr>
<td></td>
<td>0.566**</td>
<td>0.568**</td>
<td>0.545**</td>
<td></td>
</tr>
<tr>
<td>Gang unit</td>
<td>1.368 (.426)</td>
<td>0.784 (.385)</td>
<td>0.856 (0.371)</td>
<td>0.986 (0.364)</td>
</tr>
<tr>
<td></td>
<td>0.289**</td>
<td>0.166*</td>
<td>0.181*</td>
<td>0.209**</td>
</tr>
<tr>
<td>Youth male population</td>
<td>0.142 (0.153)</td>
<td>0.165 (0.135)</td>
<td>0.124 (0.130)</td>
<td>0.066 (0.128)</td>
</tr>
<tr>
<td></td>
<td>0.090</td>
<td>0.104</td>
<td>0.078</td>
<td>0.042</td>
</tr>
<tr>
<td>Population density ((\times 10^{-3}))</td>
<td>0.049 (0.022)</td>
<td>0.009 (0.021)</td>
<td>0.008 (0.021)</td>
<td>0.029 (0.022)</td>
</tr>
<tr>
<td></td>
<td>0.254*</td>
<td>0.048</td>
<td>0.043</td>
<td>0.148</td>
</tr>
<tr>
<td>Police representativeness</td>
<td>–0.044 (0.336)</td>
<td>0.127 (0.287)</td>
<td>–0.091 (0.285)</td>
<td>0.143 (0.292)</td>
</tr>
<tr>
<td></td>
<td>0.013</td>
<td>0.038</td>
<td>0.027</td>
<td>0.043</td>
</tr>
<tr>
<td>Model R(^2)</td>
<td>0.280</td>
<td>0.440</td>
<td>0.489</td>
<td>0.522</td>
</tr>
</tbody>
</table>

\(^{*}p < .05; **p < .01.\)

\(^{1}\)In Model 4, this variable was mean-centered due to creating an interaction term. 

Note. Unstandardized coefficients (\(\beta\)) and standard errors (SE, in parentheses) are located above the standardized coefficients (\(\beta\)).
Aside from these additive effects, the standardized coefficients reveal that heterogeneity exhibits an effect size twice as great as economic disadvantage.

Model 4 examines the research question of whether heterogeneity conditions the relationship between economic disadvantage and gang membership. Because a typical multiplicative term would result in multicollinearity, we employed a technique to create an interaction term that would not produce biased parameter estimates (Cohen, Cohen, West, & Aiken, 2003; Jaccard & Turrisi, 2003). We mean-centered heterogeneity (economic disadvantage, a factor score, was already mean-centered) and then multiplied the terms. For the interaction model, we can draw a meaningful conclusion about the effect size of the standardized coefficient. Jaccard and Turrisi (2003, p. 28) pointed out that we interpret this finding as the “squared semipartial correlation for the product term holding constant [the interaction term’s] component parts.” The interactive effect of heterogeneity on economic disadvantage exhibits a moderate overall effect on the dependent variable ($\beta = .211$, $p < .05$), holding the independent variable (economic disadvantage) and the moderating variable (heterogeneity) at a constant of zero. In addition, Model 4 reveals that the interaction term makes an independent contribution to the proportion of the explained variation in the dependent variable. The coefficient of multiple determination increased by nearly 7% ($R^2\Delta = .033$, $p < .01$). Figure 1 depicts the interaction effect on gang membership. The points on the graph reflect economic disadvantage and heterogeneity at low (1 SD below the mean) and high (1 SD above the mean) levels (Aiken & West, 1991). The key finding is that when heterogeneity is low, the effect of increased economic disadvantage is not particularly large; however, when heterogeneity is high, more economic disadvantage corresponds to a large increase in gang members.10

It is important to note the effect of heterogeneity in the model. With respect to the traditional Blau (1977) measure, additional analyses revealed that the more comprehensive (i.e., more ethnic groups included) measure resulted in a substantially improved model fit (results not reported in table). For example, comparing the findings in Model 3 to the more commonly used seven-group measure (Whites, Blacks, Asians, Hispanics, Native Americans, Multi-race, and Other), the variation explained decreased from .489 to .430—nearly six units or a 15% difference. This was consistent (no less than 13%) across all four models. In addition, the standardized coefficients also revealed a moderate, yet meaningful difference. Across the three models, the effect size increased over 15% ($\beta \Delta \geq .076$). These findings are extremely important not only for understanding the effects of racial and ethnic heterogeneity on gang membership, but it could also be that there are meaningful differences in effect sizes for studies examining other outcomes using the Blau measure of heterogeneity.

10. The point estimates are as follows: when heterogeneity is low, economic disadvantage results in gang membership (ln) scores 4.82 (low disadvantage) and 5.06 (high disadvantage) and a slope of 1.05. When heterogeneity is high, economic disadvantage results in gang membership (ln) scores of 5.90 (low disadvantage) and 7.38 (high disadvantage) and a slope of 1.25. The slope differences as well as the intercept difference when disadvantage is low are particularly revealing.
Discussion

The goal of the present study was to examine the theoretical correlates of gang membership across cities in the USA. In doing so, our intent was to determine whether the impact of economic disadvantage on gang membership was conditioned by heterogeneity. We did this by using U.S. Census 2000 data for city characteristics, LEMAS 2000 data for police department characteristics, and NYGS 2002-2006 data for gang membership. This study went beyond existing macro-level gang research (Jackson, 1991; Wells & Weisheit, 2001) by analyzing gang membership rather than establishing whether a city had a gang problem. Since gangs are so prevalent in large cities, this is an important step forward in understanding the role of theory in accounting for differences in gang membership. Based on our findings, there are four major implications that guide this discussion.

First, racial and ethnic heterogeneity matters. The current study found that heterogeneity had an independent, additive, and multiplicative effect on gang membership net of controls. In fact, heterogeneity exhibited the greatest effect size in every model (.545 ≤ β ≤ .568). This finding is consistent with accounts of existing gang formation research that underscore the importance of race and ethnicity (Alonso, 2004; Davis, 2006; Thrasher, 1927; Vigil, 1988, 2002), but this is the first time this theoretical framework has been applied to this unit of analysis. The support for the moderation effect indicates that greater degrees of heterogeneity and economic disadvantage are more likely to correspond with increases in gang activity. While the larger criminological field and its subset of
gang scholars have known that economic disadvantage is a correlate of social malaise (Bursik & Grasmick, 1993; Pratt & Cullen, 2005; Sampson et al., 1997; Short, 1997), the findings from the present study suggest that those ignoring heterogeneity in the gang context may be missing a key piece of the gang formation/gang membership puzzle. It is important to stress that our measure of heterogeneity is not a simple dichotomy (e.g., White/non-White); rather, this measure incorporates a larger number of racial and ethnic groups, better capturing heterogeneity within a city. Moreover, incorporating more groups into the analysis revealed a noteworthy change in effect size and model fit. It is our suggestion that researchers consider incorporating more groups into their analysis, or run the risk of underestimating the relationship between heterogeneity and the outcome of interest.

Second, theory building often outpaces empirical testing. This problem exists in the field of criminology (see, e.g., Hay, 2001), as well as within gang research. A number of influential works (Cloward & Ohlin, 1960; Cohen, 1955; Klein, 1995; Miller, 1958; Thrasher, 1927; Vigil, 1988, 2002) have offered explanations for the causes of the formation and persistence of gangs, but there are a limited number of tests that go beyond lower levels of aggregation. Jackson (1991) tested Wilson’s (1987) proposition—and Hagedorn’s (1988) application to gangs—that the US transition from a manufacturing-based to service-based economy spawned a host of social ills at a macro-level, one of them being gangs. Katz and Schnebly (in press) included economic disadvantage covariates to explain concentrations of gang members at a neighborhood level. While data limitations have surely stifled a number of thoughtful ideas, a lack of testing is a criticism that has been lodged against gang research (Katz & Jackson-Jacobs, 2004, p. 94). As Klein (2005) pointed out, it has taken over six decades to reach the present state of understanding of gangs, and much work remains to be done. Indeed, there is an empirical vacancy that needs to be filled as the accumulation and organization of knowledge is impaired to the extent that existing theory is not systematically tested (see, e.g., Pratt & Cullen, 2005). This issue is far from trivial, as policy is rooted in theory (Barlow & Decker, 2009; Cullen, 1988; Huff, 1989; Klein, 1995; Klein & Maxson, 2006; Lilly, Cullen, & Ball, 2007; Pratt, 2008; Spergel, 1995). While the goal of the present study was to “ignite” the discussion of gangs in a macro-level context, future research should continue to test the theoretical applicability of social disorganization, strain, and integrated hypotheses in examining gang-related outcomes. Moreover, it would be interesting to see how economic, demographic, and law enforcement changes over time affect gang-related outcomes.

Third, gang research tells us a lot about criminological theory. Social disorganization (Shaw & McKay, 1942; Thrasher, 1927) and extensions of strain (Cloward & Ohlin, 1960; Cohen, 1955; Miller, 1958) were influenced largely by explaining the development of deviant peer groups in a neighborhood context. The present study found heterogeneity and economic disadvantage—two cornerstones of social disorganization theory and viewed as macro-level covariates of social problems (Lilly et al., 2007; Sampson & Groves, 1989)—to be central to
accounting for the levels of gang membership across large American cities. Gangs provide fertile testing grounds for assessing the capabilities of existing theory because of their applicability across levels of explanation. Short (1985, 1989, 1998) has noted that the "unit of analysis" problem in the field of criminology is best exemplified in the gang context, where individual-level theory (e.g., self-control, negative affect), micro-level theory (e.g., differential association), and macro-level theory (e.g., social disorganization, strain/anomie) have the potential for "talking past one another" while attempting to explain the same outcome.

Fourth, the void in macro-level gang research has been an unfortunate shortcoming for policy formulation. These results suggest several implications for responding to gangs. Perhaps the most important finding from our work is that social and economic variables are more important in explaining levels of gang membership than are criminal justice system characteristics. This is not a surprising finding, as Sherman et al. (1997) remind us. The emphasis on the role of fundamental correlates of crime (economic disadvantage, racial and ethnic heterogeneity, ecological disparities) is important to emphasize in the context of our own work and that of others (Xie, 2009). For many forms of crime, the more proximate criminal justice variables make a small contribution to the explained variation in the face of other social and economic variables. For gangs, this appears to be the case as well. This means that any response to gangs must include a broad range of options; the majority of which are noncriminal justice options. As such, comprehensive models (Howell, 2003, 2009; Klein & Maxson, 2006) are far more likely to have an impact on gang formation and gang growth. The comprehensive strategy is an example of such a model, as it includes an emphasis on creating and enhancing social and economic opportunities, as well as organizing local communities in the response to gangs (Howell, 2003, 2009). Our findings regarding the role of economic disadvantage, particularly its interaction with heterogeneity, provide a strong rationale for cities to adopt approaches that take a broad view of the gang problem and address its fundamental causes. Our findings regarding the role of racial/ethnic heterogeneity also have policy relevance. Too often policies are conceived or implemented with a narrow view of the racial or ethnic composition of the groups or neighborhoods. Because of the large share of gang membership accounted for by Latinos, accurately specifying race/ethnic heterogeneity is of critical importance. This suggests that responses to gangs should partner with a broadly representative group of agencies, particularly those agencies that can enhance the economic prospects of city residents and reduce racial and ethnic isolation and tensions.

There is great theoretical and practical utility in explaining criminological outcomes such as gang membership across different units of analysis. Conceptually, it allows for a more robust confirmation when assessing the value of a specific theory. Practically, it allows for more confident conclusions to inform policy. Within the scope of the present study, it may be the case that the effects (independent, additive, and multiplicative) behave differently at a
lower unit of aggregation. But as a whole, it provides the potential for integrating concepts. Surely, data limitations have made empirical testing a burdensome task for gang research. The lack of validated measures of the number of gangs, gang members, and gang crimes introduces potential sources of measurement error. That said, the benefits of comparative research are many, and contribute to our understanding of gangs as well as broader criminological theory (Klein, 2005). Future empirical investigations should take this into account, as it is paramount to advancing gang research (and the potential for future criminological theory development) to the next stage of knowledge.

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Criminology, 41, 101-133.


Appendix A. List of Cities Included in Sample

<table>
<thead>
<tr>
<th>Akron, Ohio</th>
<th>Glendale, California</th>
<th>Philadelphia, Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuquerque, New Mexico</td>
<td>Grand Rapids, Michigan</td>
<td>Phoenix, Arizona</td>
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<tr>
<td>Anaheim, California</td>
<td>Greensboro, North Carolina</td>
<td>Pittsburgh, Pennsylvania</td>
</tr>
<tr>
<td>Anchorage municipality, Alaska</td>
<td>Hialeah, Florida</td>
<td>Plano, Texas</td>
</tr>
<tr>
<td>Arlington, Texas</td>
<td>Honolulu CDP, Hawaii</td>
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<td>Atlanta, Georgia</td>
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