

THE EFFECT OF COGNITIVE ABILITY ON STREET GANG PARTICIPATION: EVIDENCE FROM THE NLSY AND PROJECT ON HUMAN DEVELOPMENT IN CHICAGO NEIGHBORHOODS

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Abstract: In this paper, I examine the link between IQ and gang participation. Data from the NLSY97 and Project on Human Development in Chicago Neighborhoods are used to estimate time-to-first gang participation. Results from a variety of models which account for sibling effects, neighborhood effects, and non-cognitive traits indicate low IQ is a robust predictor of gang participation. I present two economic explanations for why cognitive ability is a trait on which selection of gang membership occurs: 1) lower IQ individuals generally have a lower opportunity cost for gang participation, as they have fewer legitimate opportunities for socioeconomic advancement and 2) gangs may prefer low IQ individuals as a way to reduce agency costs. Because a gang is a social grouping of deviants, I argue cognitive traits can also be expressed at the neighborhood level through these same economic channels.

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1. INTRODUCTION

Street gangs are endemic to poor urban neighborhoods the world over. Although gang activity is synonymous with crime-ridden areas, the relatively small ratio of gangsters to citizens, in even the most impoverished neighborhoods, suggests that gang participation is determined by individual characteristics.

The psychology literature documents a negative relationship between cognitive ability and the propensity for criminal behavior (see Wilson & Hernstein, 1985 and Hernstein and Murray (1994)). In this paper, I investigate the link between IQ and gang membership. Drawing upon the gang literature in sociology and some theoretical research by economists, I present two economic explanations for why cognitive ability is a trait on which selection of gang membership occurs: 1) lower IQ individuals may have a comparative advantage in violence as they generally have fewer legitimate opportunities for socioeconomic advancement and 2) gangs may prefer low-IQ individuals, if they are more likely to identify with the organization, as a way to reduce agency costs (Akerlof & Kranton, 2005). Because a gang is a social grouping of deviants, I argue cognitive traits can also be expressed at the neighborhood level through these same economic channels.¹

The early sociology literature emphasized the gang as a neighborhood phenomenon created by the disorganized assimilation of immigrants into greater urban society (Thrasher, 1927). Although subsequent sociological studies incorporate institutional constraints (e.g. race and politics) above the neighborhood level, there remains a preoccupation with the neighborhood, particularly in ethnographies of gang activity (e.g., see Hagedorn, 1998 and Venkatesh, 2000). A

¹ I assume the representative gang is a social group whose members are also social deviants. As a result, I presuppose participants in the gang *do not require* monetary remuneration from the gang. However, street gangs can and often do evolve into illicit business enterprises (Venkatesh & Levitt, 2000) .

more recent experimental literature in economics attempts to establish the magnitude and direction of neighborhood effects on a variety of socioeconomic outcomes for people from crime-ridden areas (Katz, Kling, & Liebman, 2001; Kling, Liebman, & Katz, 2005; Kling, Ludwig, & Katz, 2005; Kling, Liebman, & Katz, 2007). However, even with a well-designed social experiment, it is difficult to identify the channels through which the neighborhood affects individuals who live there (Ludwig, et al., 2008).

I extend the literature by addressing the following question. Can IQ scores explain differences in gang participation among individuals from similar socioeconomic backgrounds, the same neighborhood, or even the same family? I use two unique data sets in this study: the 1997 cohort of the National Longitudinal Survey of Youth (NLSY97) and the Project on Human Development in Chicago Neighborhoods (PHDCN). The NLSY97 collects extensive information on criminal activity, family background, socioeconomic variables, as well as cognitive and non-cognitive traits. With the NLSY97, I examine the relationship between measured cognitive ability and the general characteristics of gang participation from a nationally representative sample of the United States. Sibling comparisons are also possible with these data, as the NLSY97 samples a large percentage of multiple-respondent households. The PHDCN also collects roughly the same background information as the NLSY97. However, the PHDCN is more closely related to the ethnographic data collected by sociologists, as it contains extensive information on the neighborhood experiences of individuals.

I use survival analysis to examine the relationship between IQ and gang participation.² Results from a variety of models which account for sibling effects, neighborhood effects, and non-cognitive traits indicate low IQ is a robust predictor of gang participation. In the NLSY97, a

² The empirical approach taken in this paper is closely related to Costa & Kahn (2003) and Bodenhorn & Price (2009).

one standard deviation increase in IQ corresponds to a 26-37 percent risk reduction for initial gang affiliation. From the PHDCN, a one standard deviation increase in IQ corresponds to an 18-22 percent risk reduction for gang membership.

The paper is organized as follows. In section 2, the effect of cognitive ability on gang participation is examined in an economic context. The data and econometric methodology are introduced in section 3. Results of survival analysis are presented in section 4. Section 5 concludes.

2. THEORETICAL BACKGROUND

In *The Bell Curve*, Herrnstein and Murray (1994) argue that higher-order thinking, identified by the scalar ‘g’ through standardized tests of mental ability, is a heritable trait which predicts socioeconomic success.³ The authors cite a wide-ranging literature on social deviance and further argue that ‘g’ is a primary predictor of criminal behavior. Heckman (1995) and much of his subsequent research downplays the primary role of cognitive ability in the determination of individual outcomes. Instead, non-cognitive traits—personality characteristics which accentuate (inhibit) the accumulation of human capital—play a commensurate role (Heckman, Stixrud, & Urzua, 2006). The upshot is Herrnstein and Murray (1994) leave little room for public policy solutions, whereas Heckman’s work emphasizes the potential payoffs of early childhood education, particularly for disadvantaged children (e.g., see Heckman, 2008).⁴

An analysis of the effect of cognitive ability on criminal behavior should also incorporate these non-cognitive characteristics, as “common sense” would indicate their relevance (Heckman, Stixrud, & Urzua, 2006). In the case of gang participation, the inclusion of these

³ Following publication, a literature (mostly critical), addressing the claims made in *The Bell Curve*, emerged. For an introduction to this literature, see Currie & Thomas (1999), Goldberger & Manski (1995), and Heckman (1995).

⁴ The greater malleability of non-cognitive skills relative to cognitive skills is another key justification for public policy measures which help promote an environment where these skills can be accumulated (Heckman, 2008).

variables is crucial as it has been widely reported in the literature that gang members generally are deficient in these characteristics.⁵ Non-cognitive traits are also likely correlated with measured cognitive ability, which if omitted could bias estimates of cognitive ability's effect on gang participation.

In most cities where gang activity is prominent, neighborhoods are stratified along socioeconomic boundaries; hence, disadvantaged children grow up in very different environments. While it is not yet clear how the neighborhood environment might affect cognitive and non-cognitive traits, it is widely known that impoverished urban areas have low levels of human capital and persistent unemployment (Wilson W. J., 1987). Social experiments on neighborhood transition (from low-to-high socioeconomic status areas) reveal that younger people reap the largest economic benefits from a healthier neighborhood environment (Ludwig, et al., 2008).⁶

In this paper, I take a different approach by asking how latent characteristics, specifically cognitive ability, can manifest themselves at the neighborhood level. The social nature of the outcome variable, gang participation, offers an opportunity to study the social and economic forces which drive criminal group selection and, as a result, neighborhood composition. Below, I present two economic explanations for the linkage between cognitive ability and gang participation.

HYPOTHESIS #1: LOW IQ EQUALS LOW OPPORTUNITY COST OF GANG ACTIVITY

To my knowledge, Short and Strodbeck (1965, pp. 237-238) were the first to measure intelligence quotients for gang and non-gang members. The authors find that gang members

⁵ For example, see Jankowski (1991) who discusses the “defiant individualism” of gang members.

⁶ See Durlauf (2004) for an excellent review of the neighborhood effects literature.

consistently scored lower on cognitive achievement tests than did non-gang members from the same race/neighborhood.

“These findings are impressive because of their consistency and the care with which the test program was developed and administered. They offer convincing evidence that the gang members were disadvantaged with respect to intellectual ability of the sort which is rewarded by the institutions of conventional society.” (Short & Strodtbeck, 1965, p. 238)

With data from the NLSY97, Seals (2009) confirms this finding, as gang participation of individuals with lower IQs is more sensitive to the strength of the local labor market than those with higher IQs.

There may also be another extension of this logic. For culturally and economically isolated neighborhoods, gangs often provide services (i.e. security) for members of their communities when government does not (Jankowski, 1991; Sobel & Osoba, 2009).⁷ The economies of these neighborhoods are also relatively primitive, as they are often characterized by a lack of access to credit and a high ratio of barter-to-cash transactions (Venkatesh, 2006). Furthermore, gangs are common to areas where property rights are not well defined because of wide-spread illicit enterprise (Venkatesh, 2006). Skaperdas & Syropoulos (1995) develop a model in which the gang takes the form of a primitive government (in a state of nature) and individuals select into gangs based upon comparative advantage in violence. Hence, it could also be argued that conditional on neighborhood characteristics, lower-IQ individuals have a comparative advantage in the “protection” of their respective neighborhoods.

HYPOTHESIS #2: LOW IQ AND DEMAND FOR GANG MEMBERS

Unlike the study of criminal participation (e.g., Grogger, 1998), demand-side behavior—the gang—must be considered in an analysis of gang participation. Incompetence in other

⁷ For example, Sobel and Osoba (2009) argue that gangs form when the bona fide government does not protect the private property of its citizenry. Sobel and Osoba (2009) then present evidence that crime causes gangs, consistent with their hypothesis, rather than the traditionally held hypothesis that gangs cause crime.

economically viable activities may be an important characteristic a gang looks for in prospective members (Gambetta, 2009).⁸ If an individual has few outside options, then gang members may believe the person is more likely to identify with the organization. Although the more intelligent members of the gang may rise to administer the organization, as indicated in Venkatesh (2000), it may be advantageous to staff the gang with a disproportionate amount of low-IQ members in order to reduce agency costs.

In the early urban sociology literature, gangs were thought to be the product of temporary social disorganization (Thrasher, 1927). However, Hagedorn (2007) argues that these traditional sociological explanations for gang behavior are not confirmed, as some gangs have operated in cities like Chicago and Los Angeles for generations. Hagedorn (2007a, 2007b, and 2008) applies some basics of organizational theory and presents evidence that street gangs can evolve into rational institutions. One of the key characteristics of institutionalized gangs is the practice of myth-making: e.g., “the gang helps the community” or “the gang lives on forever.” Establishing a constitution (Leeson, 2007; Skarbek, forthcoming) for the gang could also be interpreted as a manifestation of this kind of behavior. Conditional on the organization of the gang, low-IQ gang members may be more likely to follow a code of conduct or other sets of rules established by the gang.

3. DATA AND ECONOMETRIC METHODOLOGY

In sections 3.1 and 3.2, I discuss the characteristics of the NLSY97 and PHDCN data sets, respectively.

3.1. GANG ACTIVITY IN THE NLSY97

⁸ “Incompetence is one way of telling people [other criminals] *You can count on me, for even if I wanted to, I would not be able to cheat you*” (Gambetta, 2009, p. 50).

The NLSY97 is an ongoing, annual survey from the cohort of 12-16 year olds living in the United States in 1997. The initial sample contains 8,984 respondents: composed of a nationally representative cross-section of the population and an oversample of Blacks and Hispanics. Survey participants are asked a battery of questions on family background, socioeconomic status, as well as a variety of cognitive and non-cognitive ability measures. The NLSY97 also contains a large number of households with multiple respondents—out of the initial 6,819 unique households, 1,862 include more than one respondent—which allow for the comparison of cognitive and non-cognitive traits within a household.

The NLSY97 has several features which facilitate the study of gang participation. The data set contains detailed information on gang and other criminal activity, along with a variety of other risky behaviors. To help ensure anonymity (and presumably truthfulness), the responses to these sensitive questions are recorded using computer-assisted, self-interview technology without an interviewer present. Gang activity is recorded for each year of the survey up to 2005. NLSY participants are asked a variety of questions related to gang affiliation, such as whether they have friends or relatives in a gang; ever been in a gang; age first joined a gang; and whether they had been in a gang in the past year.

The consistency of the interview questions across time allows me to construct event study data using successive waves of the NLSY97. First, I treat time before the survey began as one long episode. Each survey-year of the NLSY represents an additional time period. The time-to-first gang participation is coded by following the individual through the survey until the first admission of gang affiliation occurs. Persons who exit the sample or who never join a gang during the survey are treated as censored.

Approximately 80 percent of initial respondents were administered the Armed Services Vocational Aptitude Battery (ASVAB) exam. The ASVAB is used by the U.S. military to help match individuals to specific jobs within the military. The test is composed of ten subtests of which four of those subtests evaluate mathematical and verbal ability. From these four subtests the NLSY staff constructed a measure of cognitive ability similar to the Armed Forces Qualifying Test (AFQT) from the NLSY79 used by Hernstein and Murray (1994) and many others as an IQ score. The score is weighted by respondent's age at the time of the test.⁹

FIGURE 1 shows kernel density estimates of standardized ASVAB scores from the NLSY97 for gang members and non-gang members. The distribution of scores for gang members in the NLSY97 is noticeably right skewed and the average IQ for gang members is 0.63 standard deviations below that of non-gang members.¹⁰

The NLSY97 also collects information on non-cognitive, personality traits which could influence both the decision to join a gang and the value of the ASVAB score. The NLSY97 does not contain the same non-cognitive traits as the NLSY79 used by Heckman, Stixrud, & Urzua (2006).¹¹ However, there are a number of personality trait measures in the NLSY97 I use in this paper, which closely resemble those in the NLSY79: 1) has trouble paying attention; 2) lies or cheats; 3) doesn't get along well with others; 4) often unhappy; 5) generally optimistic about the future.

TABLE 1 displays population-weighted means and definitions of the NLSY97 variables used in the econometric analysis. Gang members report greater exposure to violence at young ages

⁹ See the NLSY97 Appendix 10: <http://www.nlsinfo.org/nlsy97/nlsdocs/nlsy97/codesup/mapp10.html>.

¹⁰ Sample means are weighted using the panel population weights created by NLSY staff. Difference in means is statistically significant at the 1% level using a two-sample t-test.

¹¹ Heckman, Stixrud, & Urzua (2006) use the Rotter Locus of Control and the Rosenberg Self-Esteem scales.

and presence of gangs in their neighborhoods and schools than do non-gang members. However, gang members do not appear that different with respect to non-cognitive traits.

3.2. GANG ACTIVITY IN THE PHDCN

The Project on Human Development in Chicago Neighborhoods incorporates longitudinal and community surveys to create a comprehensive study of the social and family processes which cause delinquency. The community surveys were conducted by randomly selecting households from all of Chicago's neighborhoods. Respondents were asked about violence, socioeconomic status, political composition, and other environmental characteristics of their neighborhood. Eighty neighborhoods from the community survey sample were selected for a longitudinal cohort study. The study includes cohorts of 3, 6, 9, 12, 15, and 18 year olds, as well as a birth cohort. The first wave of data for longitudinal study was collected from 1994-1997, second wave from 1997-2000, and the third wave during 2000-2002. From the National Institute of Justice, I obtained restricted access data which allows me to link respondents to their respective neighborhoods across waves of the survey.

The longitudinal survey is composed of approximately 7,000 individuals. Respondents and/or their primary caregivers are asked questions concerning their family, neighborhood, and school environments, in addition to a variety of personality and health questions. Participants also take a number of standardized tests which measure cognitive ability, which are discussed later. A much richer set of variables on the gang and other criminal activity of respondents and their friends than in the NLSY97 are also recorded. TABLE 2 shows the different responses to questions about gangs from those who are or have been gang members, those who live in neighborhoods where gangs are present. Gang members overwhelmingly report that gangs are present at school and in their neighborhoods. Gang members also report at a higher rate that the

neighborhood gang helps kids and other neighborhood residents, which indicates that gangs may indeed provide services to their community.

Because gang activity is the focus of only one component in the third wave of the longitudinal survey, I create the dependent variable differently than in the NLSY97. I use the information on age first joined a gang to construct event data. The data are transformed such that the time intervals are defined by age integers. Variables are matched from each wave of the study to the age of the respondent in that wave. I also make use of other components of the longitudinal study, the first, second, and third waves of the Self-Report of (Delinquent) Offending. In the first and second waves, respondents are asked if they were ever involved in a gang fight. If they answered in the affirmative, those responses were matched to their respective age and coded as a gang member. In the second wave of the Self-Report Offending component, participants were asked if, “they identified themselves as a gang member.” The answers to this question were matched to the age of the individual in that wave and those answering in the affirmative were also coded as gang members.

The PHDCN staff administered a variety of intelligence tests to participants of the longitudinal study. I use the Wechsler Intelligence Scale for Children (WISC) because it is a widely known measure of general intelligence and was given to the highest number of participants within the sample.¹² The WISC test was given to the 6, 9, 12, and 15 year-old cohorts of the longitudinal study for which information on gang activity is available. As a result, I limit the sample of at-risk gang members to these cohorts.

The PHDCN staff also administered the Emotionality, Activity, Sociability, and Impulsivity (EASI) Temperament Survey to the primary caregivers of cohorts 3, 6, 9, 12, 15 from the

¹² See <http://www.icpsr.umich.edu/cocoon/PHDCN/STUDY/13604.xml> for a more complete description.

longitudinal survey. The EASI is a forty-question instrument designed to measure a person's temperamental tendencies. For example, sociability questions were designed to measure the person's desires to be around others and impulsivity a measure of how well one controls his/her impulses, etc. Each question is scaled: 1 = uncharacteristic, 2 = somewhat uncharacteristic, 3 = neither, 4 = somewhat characteristic, and 5 = characteristic. The mean of the responses to certain are questions were converted into continuous index variables which measure *impulsivity*, *inhibitory control*, *sensation-seeking*, *persistence*, *activity*, *emotionality*, and *sociability*. For example, *inhibitory control* was constructed by taking the mean of the responses to five questions which scale the person's ability to control his/her impulses.

Table 3 presents means for key variables used in the analysis of the PHDCN. Almost all differences in means between gang and non-gang members are as expected. However, gang members perform better, on average, than non-gang members on the *wisc*.¹³ While this result is opposite to what is found in the NLSY97, the PHDCN is a much different sample, as individuals are drawn randomly from neighborhoods. Additionally, an unconditional mean for the *wisc* variable could be misleading as several different cohorts which could be as much as nine years apart are used to compute the mean, whereas in the NLSY97 the age difference of respondents is a maximum of four years.

4. RESULTS

4.1. ECONOMETRIC SPECIFICATION

Survival analysis is used to estimate the effect of cognitive ability on time-to-first gang involvement. The approach is attractive because it focuses attention on the initial connection to

¹³ The difference in means between the groups is statistically significant at the 1 percent confidence level.

gang activity—an important issue for public policy, as gang activity is associated with greater criminality (Thornberry, Huizinga, & Loeber, 2004) and corresponds well to the longitudinal data of the NLSY97 and PHDCN.

I estimate time-to-first gang participation with a Weibull proportional hazard model of the form $h(t) = h(0) \exp(\beta_1 \text{cognitive} + \beta_2 \text{non-cognitive} + \sum_{i=3}^n \beta_i X_i)$, in which *cognitive* is a measure of cognitive ability taken from a standardized test; *non-cognitive* is a measure of personality characteristics; X_i represents a vector of other variables which explain the transition into a gang; and β_i are parameters to be estimated. The baseline hazard is assumed to take the functional form $h_0 = pt^{p-1} \exp(\beta_0)$, in which p represents the shape parameter of the Weibull distribution, t represents time, and $\exp(\beta_0)$ is the scale parameter (Cleeves, Gould, Gutierrez, & Marchenko, 2008).

4.2. SURVIVAL ANALYSIS RESULTS FROM THE NLSY97

Estimates of the hazard function for gang participation in the NLSY97 are presented in TABLE 4. Models 1-4 show how the estimated effect of cognitive ability on gang participation varies with additional control variables. The effect of *asvab* is consistent across all specifications. A one standard deviation increase in *asvab* decreases the risk of first joining a gang by 28.9-31.9 percent.¹⁴

The results are also roughly consistent across models for the other covariates. Exposure to gangs and violence increases the risk of gang membership dramatically. Males are three-to-five times more likely to become gang members. All non-cognitive traits except *attention* are also

¹⁴ Coefficient estimates for test scores from the NLSY97 and PHDCN are standardized for ease of comparison.

significant predictors of gang membership. Each additional year of education decreases the risk of gang membership by 17.2-26.0 percent, a huge effect.

The results in TABLE 5 show the estimated effect of cognitive ability on gang participation for the sample of siblings in the NLSY97. Using data from households with multiple respondents, I control for the number of gang members in each household (*#familygangmembers*) and sibling fixed effects. Sibling fixed effects reduce possible bias due to omitted, genetic characteristics correlated with IQ that also affect criminality. The sample of siblings does not include step or half siblings, which rules out genetic risk for criminality (gang behavior) inherited from the mother and father, because the process of meiosis randomly distributes genes across siblings (D'Onofrio, et al., 2009). Because sibling differences use only full siblings, differential genetic risk from other fathers can also be ruled out. However, sibling differences cannot rule out time-varying, risk factors which may not be shared by siblings that are correlated with IQ and affect gang participation, such as, family dissolution (D'Onofrio, et al., 2009). To mitigate concerns of omitted within-family variation in these types of characteristics I control for the presence of a father figure (*fatherfigure*) when the respondent was twelve years-old.

The estimated effect of cognitive ability on gang participation is statistically significant and negative across all four specifications. However, there are significant differences between the models in TABLE 4 and those in TABLE 5. In Models 1 and 2, holding constant number of gang members in the household, a one standard deviation increase in ASVAB score decreases the risk of first gang affiliation by 25.0 and 23.7 percent, respectively. In Models 3 and 4, which also include sibling fixed effects, a one standard deviation increase in ASVAB scores decreases the gang hazard from 63.9 and 44.7 percent, respectively. The effect of education on gang

membership is no longer statistically significant. Only two of the non-cognitive traits—*unhappy* and *optimistic*—have a statistically significant effect on the gang membership hazard. The impact of these variables is also considerably different between the models with and without sibling effects.

4.3. SURVIVAL ANALYSIS RESULTS FROM THE PHDCN

Estimation results from the PHDCN sample are presented in TABLE 6. The estimated effect of cognitive ability on gang participation is again consistent across all specifications. A one standard deviation increase in *wisc* corresponds to a 17.8-22.5 risk reduction for gang affiliation.

The inclusion of neighborhood variables does not substantially affect the magnitude or statistical significance of *wisc*. Gang activity in the neighborhood increases the gang membership hazard by 62.8-74.1 percent. Living in a predominately Hispanic neighborhood increases the chance of gang membership almost three-fold. Non-cognitive traits appear to play very little role, as all except *inhibitory* are not statistically different from unity. However, a one unit increase in this variable corresponds to a 35.2 percent increase in risk of gang membership. Children of women who drop out of high school are 5 times more likely to become a gang member in the PHDCN.

TABLE 7 shows results for models where a dummy (*neighborIQ*) for whether or not the i_{th} individual's IQ is above the mean level of IQ in a neighborhood is included. The dummy captures whether the estimated effect of *wisc* on the gang hazard depends on the level of measured cognitive ability in one's neighborhood. The mean level of IQ in a neighborhood is calculated by averaging the *wisc* scores of each respondent in a neighborhood/year cell, less the i_{th} individual's score. Including *neighborIQ* offers a plausible test of hypothesis #1: gang members may have lower opportunity cost (and possibly a comparative advantage) in gang

activity within their respective neighborhood. The coefficients for *wisc* and *neighborIQ* are statistically significant and less than one in Model 1. However, the coefficient for *wisc* is not statistically different from unity in the remaining models, which indicates that individual heterogeneity alone is not driving gang participation. An above average IQ, with respect to your neighborhood peers, reduces the risk of gang participation by 26.3-43.0 percent.

5. CONCLUSION

The current trend of increasing urbanization in the developing world portends a more prominent role for gangs in the future. An important question for public policy is whether or not gang members are psychologically unique, as most crimes are committed by groups rather than lone individuals (Gambetta, 2009; Thornberry, Huizinga, & Loeber, 2004).

In this paper, I address this question by estimating hazard models of time-to-first gang involvement with data from the NLSY97 and PHDCN. The effect of measured cognitive ability on gang participation is negative and statistically significant across a number of specifications. The results appear all the more robust as the estimates are obtained from two fundamentally different samples of data using two different tests of cognitive ability. In the NLSY97, these estimated effects are also robust to the inclusion of non-cognitive traits, gang activity of siblings, as well as time-invariant sibling effects. From the PHDCN, I find that after conditioning on a number of other neighborhood and individual characteristics, persons below the mean level of IQ in the neighborhood are far more likely to join a gang.

Two economic explanations are presented to explain the relationship between cognitive ability and gang participation. First, conditional on neighborhood characteristics, low-IQ individuals may have comparative advantage in violence, relative to their peers. Secondly, gangs may prefer low-IQ individuals as a way to reduce agency costs.

Gangs are a common element of communities trapped in the “vicious cycle” of poverty (Wilson W. J., 1987). Those who reside in areas where gangs thrive are likely to have similar life experiences, as social networks within these areas are often dense (Venkatesh, 2000; Venkatesh, 2006). Hence, even if relatively few inhabitants of a given neighborhood are gang members, the selection of those with lower levels of cognitive ability into the gang could alter the expected returns to human capital investment for others.

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TABLE 1: DEFINITIONS AND MEANS OF KEY VARIABLES FROM NLSY97

	<u>Definition</u>	<u>Full Sample</u>	<u>Gang Members</u>	<u>Non-Gang Members</u>
<u>Gangs and Violence</u>				
<i>gang</i>	=1 if ever a gang member	0.144		
<i>gangarea</i>	=1 if gangs inhabit school or neighborhood	0.171	0.755	0.162
<i>bully</i>	=1 if bullied before 12 years old	0.200	0.323	0.198
<i>shot</i>	=1 if saw someone shot before 12 years old	0.078	0.257	0.075
<u>Cognitive Ability</u>				
<i>asvab</i>	percentile score for ASVAB	52.468	32.487	52.772
<u>Non-Cognitive Traits</u>				
<i>attention</i>	=1 if has trouble paying attention	0.902	0.903	0.902
<i>liescheats</i>	=1 if lies or cheats	0.877	0.898	0.877
<i>dontgetalong</i>	=1 if doesn't get along well with others	0.851	0.808	0.852
<i>unhappy</i>	=1 generally unhappy	0.862	0.834	0.862
<i>optimistic</i>	=1 generally optimistic	0.482	0.495	0.482
<u>Individual Characteristics</u>				
<i>male</i>	=1 if sex is male	0.507	0.764	0.503
<i>age</i>	age (integer) at survey date	18.939	17.403	18.963
<i>Black</i>	=1 if race is Black	0.145	0.256	0.143
<i>Hisp</i>	=1 if race is Hispanic	0.116	0.194	0.115
<i>urban</i>	=1 if resides in urban area	0.732	0.736	0.732
<i>hgc</i>	highest grade completed (integer)	11.366	9.661	11.393
<i>fatherfigure</i>	=1 if male parental figure present	0.746	0.620	0.750
<i>obs</i>		47,777	935	46,842

Notes: 'Full Sample' is the sample used for estimation and reflects number of *obs* after list-wise deletion. Sample means are calculated using panel weights generated by NLSY staff. There are 1,114 respondents (approximately 12.24 percent of the initial sample) who admit some gang activity during the sample. However, because only 80 percent of the initial 8,984 took the ASVAB and because of missing values for other explanatory variables the number of gang members is 935 out of 6,491 (approximately 14.4 percent of the remaining sample) respondents remaining from the initial sample.

TABLE 2: ATTITUDES TOWARD GANGS IN THE PHDCN

<u>Dummy = 1 if response is yes</u>	<u>full sample</u>	<u>gang members</u>	<u>non-gang members</u>
any gangs in neighborhood?	0.611	0.8738	0.59412
neighborhood gangs involved in community activities?	0.186	0.2486	0.1802
neighborhood gangs protect members?	0.7736	0.8155	0.76953
neighborhood gangs help residents?	0.213	0.3262	0.2024
neighborhood gangs fight w/ other gangs?	0.8736	0.9278	0.86828
neighborhood gangs help neighborhood kids?	0.2916	0.3823	0.2826
neighborhood gangs do illegal things?	0.8925	0.9197	0.8898
neighborhood gangs do fun (legal) things together?	0.5189	0.5909	0.5117
presence of gangs impact where you go?	0.3512	0.4065	0.34746
any kids at school belong to gang?	0.4558	0.8695	0.4436

Notes: Means are calculated from the available observations from the 3, 6, 9, 12, 15, and 18 year-old cohorts.

TABLE 3: MEANS OF KEY VARIABLES FROM PHDCN

<u>Variables</u>	<u>Definition</u>	<u>Full Sample</u>	<u>Gang Members</u>	<u>Non-Gang Members</u>
<i>gangmember</i>	=1 if individual was ever in a gang	0.085		
<u>Cognitive Ability</u>				
<i>wisc</i>	Wechsler Intelligence Scale for Children Revised	25.394	30.298	24.940
<u>Neighborhood Characteristics</u>				
<i>gangarea</i>	=1 if any gangs in neighborhood	0.698	0.883	0.680
<i>mostlyblack</i>	=1 if neighborhood population majority Black	0.165	0.267	0.156
<i>mostlyhisp</i>	=1 if neighborhood population majority Hispanic	0.100	0.081	0.102
<i>high-ses</i>	=1 if neighborhood is high socioeconomic status	0.200	0.169	0.203
<i>low-ses</i>	=1 if neighborhood is low socioeconomic status	0.306	0.310	0.305
<u>Non-Cognitive Traits</u>				
<i>impulsivity</i>	scales (1-5) level of impulsivity	2.705	2.915	2.686
<i>inhibitory control</i>	scales (1-5) self-control, where 5 is least self-control	2.489	2.840	2.457
<i>sensation-seeking</i>	scales (1-5) need to seek out new experiences	2.776	2.908	2.764
<i>persistence</i>	scales (1-5) persistence in performing tasks	2.475	2.742	2.451
<i>activity</i>	scales (1-5) energy and activity level	3.716	3.594	3.728
<i>emotionality</i>	scales (1-5) emotional response to different situations	2.828	2.742	2.835
<i>sociability</i>	scales (1-5) desire to be around others	3.736	3.662	3.743
<u>Individual Characteristics</u>				
<i>male</i>	=1 if sex is male	0.491	0.747	0.467
<i>Black</i>	=1 if race is Black	0.340	0.556	0.320
<i>Hisp</i>	=1 if race is Hispanic	0.450	0.308	0.463
<i>Asian</i>	=1 if race is Asian	0.012	0.002	0.013
<i>momdropout</i>	=1 if mother dropped out of high school	0.127	0.138	0.125
<i>no. obs</i>		4937	419	4518

Notes: Number of observations reflects the sample used in estimation. Due to the sampling procedure of the PHDCN with respect to *wisc*, only 6, 9, 12, and 15 year old cohorts are used.

Table 4: Results from Survival Analysis for the NLSY97

	<u>Model 1</u>		<u>Model 2</u>		<u>Model 3</u>		<u>Model 4</u>	
<u>Cognitive Ability</u>	<u>Hazard Ratio</u>	<u>Std. Error</u>	<u>Hazard Ratio</u>	<u>Std. Error</u>	<u>Hazard Ratio</u>	<u>Std. Error</u>	<u>Hazard Ratio</u>	<u>Std. Error</u>
<i>std(asvab)</i>	0.681***	0.054	0.697***	0.058	0.692***	0.053	0.711***	0.060
<u>Gangs and Violence</u>								
<i>gangarea</i>					11.754***	1.196	10.534***	1.102
<i>bully</i>					1.396***	0.155	1.420***	0.176
<i>shot</i>					1.619***	0.200	1.480***	0.207
<u>Non-Cognitive Traits</u>								
<i>attention</i>			1.155	0.259			1.067	0.226
<i>liescheats</i>			1.931***	0.363			1.837***	0.329
<i>dontgetalong</i>			1.574***	0.230			1.412**	0.198
<i>unhappy</i>			2.179***	0.358			2.031***	0.320
<i>optimistic</i>			0.356***	0.036			0.375***	0.040
<u>Individual Characteristics</u>								
<i>male</i>	2.861***	0.323	5.115***	0.662	2.670***	0.308	4.134***	0.545
<i>Black</i>	1.304*	0.206	1.363**	0.224	0.916	0.129	1.035	0.156
<i>Hisp</i>	1.424**	0.215	1.423***	0.226	1.072	0.158	1.092	0.168
<i>urban</i>	1.017	0.132	1.065	0.133	0.733**	0.097	0.789*	0.107
<i>hgc</i>	0.740***	0.030	0.771***	0.036	0.798***	0.034	0.828***	0.036
<i>fatherfigure</i>	0.736**	0.096	0.865	0.118	0.765*	0.109	0.865	0.114
<i>mom educ dummies</i>	X		X		X		X	
<i>age dummies</i>	X		X		X		X	
<i>region dummies</i>	X		X		X		X	

Notes: ***, **, * denotes hazard ratio is statistically different from unity at the 1, 5, and 10 percent levels, respectively. All models use 47,777 observations. Estimates are weighted using panel weights generated by NLSY staff. Standard errors are clustered at the individual level. The variable *std(asvab)* is created by standardizing *asvab*.

TABLE 5: RESULTS FROM ANALYSIS OF SIBLINGS IN THE NLSY97

	<u>Model 1</u>		<u>Model 2</u>		<u>Model 3</u>		<u>Model 4</u>	
<u>Cognitive Ability</u>	<u>Hazard Ratio</u>	<u>Std. Error</u>	<u>Hazard Ratio</u>	<u>Std. Error</u>	<u>Hazard Ratio</u>	<u>Std. Error</u>	<u>Hazard Ratio</u>	<u>Std. Error</u>
<i>std(asvab)</i>	0.750**	0.097	0.763**	0.105	0.361**	0.183	0.553*	0.177
<u>Gangs and Violence</u>								
<i>gangarea</i>	11.189***	1.623	10.043 ***	1.484	7.800***	1.909	5.973***	1.396
<i>#familygangmembers</i>	2.144***	0.319	1.983***	0.300	0.779	0.228	0.885	0.216
<i>bully</i>	1.374*	0.228	1.346*	0.236	3.872**	2.594	2.914*	1.652
<i>shot</i>	1.437**	0.266	1.411*	0.273	1.356	0.862	2.358	1.742
<u>Non-Cognitive Traits</u>								
<i>attention</i>			1.288	0.418			2.066	2.569
<i>liescheats</i>			1.329	0.390			13.533**	15.628
<i>dontgetalong</i>			1.259	0.277			2.622	3.128
<i>unhappy</i>			2.438 ***	0.584			0.587	0.653
<i>optimistic</i>			0.391 ***	0.062			0.036***	0.022
<u>Individual Characteristics</u>								
<i>male</i>	3.075***	0.504	4.522***	0.856	8.594***	4.222	7.528***	4.007
<i>Black</i>	0.807	0.166	0.905	0.190	0.997	5.725	7.631	3.319
<i>Hisp</i>	1.1216*	0.235	1.159	0.254	0.266	0.428	1.408	1.326
<i>urban</i>	0.799	0.157	0.873	0.178	0.645	0.159	0.644*	0.163
<i>hgc</i>	0.913	0.053	0.952	0.044	1.075	0.087	1.0367	0.089
<i>fatherfigure</i>	0.573*	0.101	0.582***	0.113	0.808	0.639	0.936	0.718
<i>mom educ dummies</i>	X		X		X		X	
<i>Sibling effects</i>					X		X	
<i>age dummies</i>	X		X		X		X	
<i>region dummies</i>	X		X		X		X	

Notes: ***, **, * denotes hazard ratio is statistically different from unity at the 1, 5, and 10 percent levels, respectively. All models use 21,803 observations. Estimates are weighted using panel weights generated by NLSY staff. Standard errors are clustered at the household level. The variable *std(asvab)* is created by standardizing *asvab*.

TABLE 6: RESULTS FROM SURVIVAL ANALYSIS OF THE PHDCN

Variables	Model 1		Model 2		Model 3		Model 4	
	Hazard Ratio	Std. Error	Hazard Ratio	Std. Error	Hazard Ratio	Std. Error	Hazard Ratio	Std. Error
<u>Cognitive Ability</u>								
<i>std(wisc)</i>	0.775***	0.066	0.776***	0.068	0.814**	0.068	0.822**	0.074
<u>Neighborhood Characteristics</u>								
<i>gangarea</i>			1.628***	0.362			1.741**	0.403
<i>mostlyblack</i>			1.452	0.667			1.346	0.655
<i>mostlyhispanic</i>			2.711**	1.091			2.621**	1.021
<i>high-ses</i>			1.190	0.215			1.165	0.204
<i>low-ses</i>			1.216	0.365			1.256	0.375
<u>Individual Characteristics</u>								
<i>male</i>	3.285***	0.470	3.712***	0.548	3.079***	0.493	3.402***	0.545
<i>Black</i>	1.963***	0.344	1.742**	0.427	1.981***	0.378	1.599*	0.419
<i>Hispanic</i>	0.763	0.162	0.952	0.246	0.880	0.203	1.057	0.289
<i>Asian</i>	0.605	0.632	2.733	2.450	0.737	0.758	3.357	2.689
<i>momdropout</i>	5.346***	0.862	5.187***	0.859	5.355***	0.880	5.495***	0.924
<i>neighborhood dummies</i>			X				X	
<u>Non-Cognitive Traits</u>								
<i>impulsivity</i>					0.954	0.294	0.981	0.385
<i>inhibitory</i>					1.252*	0.147	1.352**	0.201
<i>sensation-seeking</i>					1.002	0.126	0.940	0.143
<i>persistence</i>					1.177	0.170	1.178	0.188
<i>activity</i>					0.994	0.076	1.012	0.087
<i>emotionality</i>					0.980	0.077	0.927	0.091
<i>sociability</i>					1.068	0.111	1.074	0.119
no. obs	4,689		4,689		4,613		4,613	

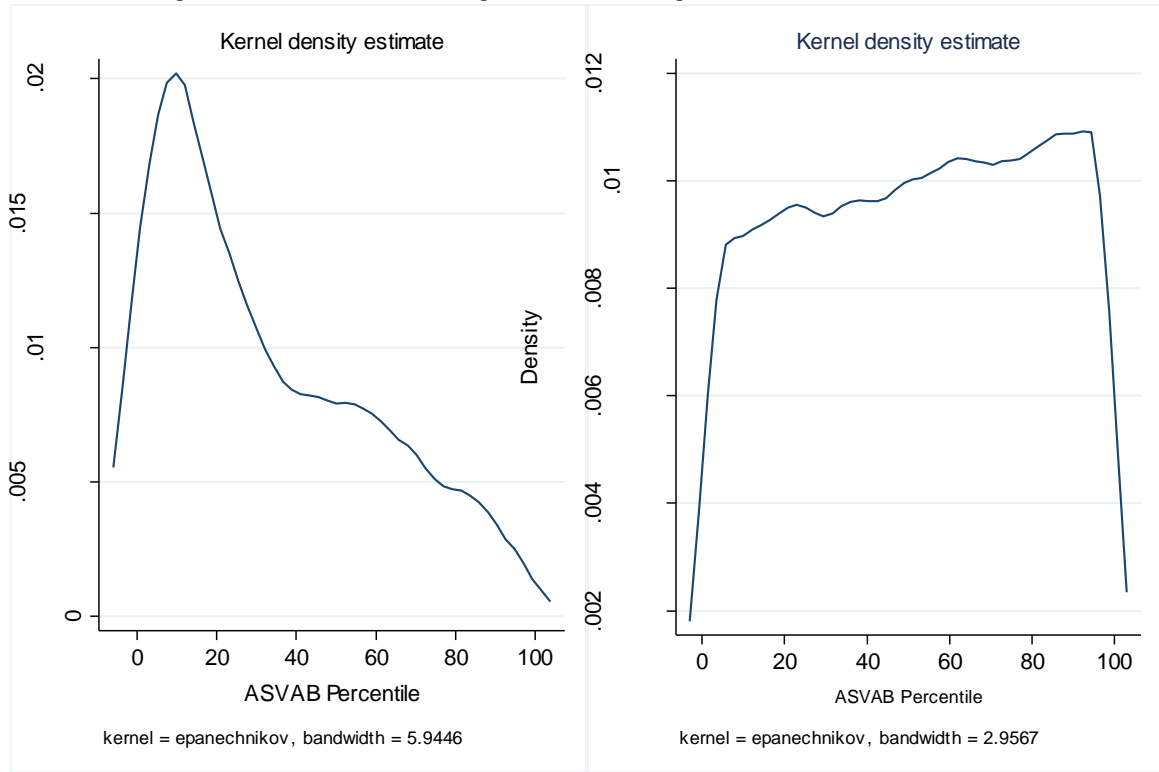
Notes: ***, **, * denotes hazard ratio is statistically different from unity at the 1, 5, and 10 percent levels, respectively. Standard errors are clustered at the neighborhood level. The variable *std(wisc)* is created by standardizing the variable *wisc* described in Table 3.

TABLE 7: NEIGHBORHOOD EFFECTS IN THE PHDCN

	<u>Model 1</u>		<u>Model 2</u>		<u>Model 3</u>		<u>Model 4</u>	
	<u>Hazard Ratio</u>	<u>Std. Error</u>	<u>Hazard Ratio</u>	<u>Std. Error</u>	<u>Hazard Ratio</u>	<u>Std. Error</u>	<u>Hazard Ratio</u>	<u>Std. Error</u>
<u>Cognitive Ability</u>								
<i>std(wisc)</i>	0.839**	0.076	0.925	0.102	0.881	0.080	0.983	0.111
<i>neighborIQ</i>	0.753*	0.119	0.594**	0.139	0.737**	0.112	0.570**	0.136
<u>Neighborhood Characteristics</u>								
<i>gangarea</i>	1.774***	0.377	1.724**	0.389	1.771***	0.371	1.817***	0.419
<i>mostlyblack</i>			1.464	0.745			1.4606	0.700
<i>mostlyhispanic</i>			2.796***	0.937			2.668***	0.853
<i>high-ses</i>			1.224	0.214			1.182	0.208
<i>low-ses</i>			1.396	0.418			1.458	0.437
<u>Individual Characteristics</u>								
<i>male</i>	3.198***	0.460	3.719***	0.550	3.044***	0.491	3.3957***	0.555
<i>Black</i>	1.988***	0.374	1.730*	0.463	2.168***	0.446	1.693*	0.468
<i>Hispanic</i>	0.804	0.184	0.972	0.269	0.987	0.239	1.136	0.323
<i>Asian</i>	0.589	0.616	1.7157	2.037	0.769	0.793	2.114	2.464
<i>momdropout</i>	5.330***	0.847	5.204***	0.858	5.416***	0.878	5.444***	0.917
<i>neighborhood dummies</i>			X				X	
<u>Non-Cognitive Traits</u>								
<i>impulsivity</i>					0.998	0.318	0.907	0.367
<i>inhibitory</i>					1.235*	0.148	1.3758**	0.207
<i>sensation-seeking</i>					0.988	0.126	0.951	0.145
<i>persistence</i>					1.158	0.166	1.206	0.189
<i>activity</i>					1.002	0.076	1.024	0.088
<i>emotionality</i>					0.993	0.080	0.935	0.093
<i>sociability</i>					1.073	0.114	1.091	0.127
no. obs	4,617		4,617		4,614		4,614	

Notes: ***, **, * denotes hazard ratio is statistically different from unity at the 1, 5, and 10 percent levels, respectively. Standard errors are clustered at the neighborhood level. The variable *std(wisc)* is created by standardizing the variable *wisc* described in Table 3.

Fig. 1: Distribution of Gang and Non-Gang Members' ASVAB Scores



Kernel density estimates generated using panel weights provided by NLSY.